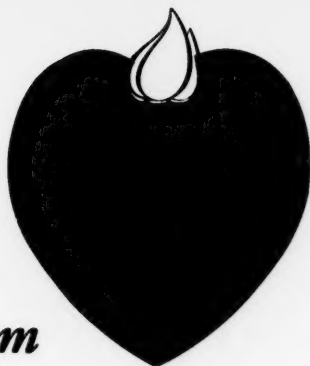


MODERN MEDICINE



Symposium *on Heart Disease*

Complete table of contents page 8



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The psychogenic factors which so often contribute to hypertension are usually aggravated by the restrictions which the disease itself places on the patients' activities. The result is a *vicious circle* that forces pressures to higher levels and renders management increasingly difficult.

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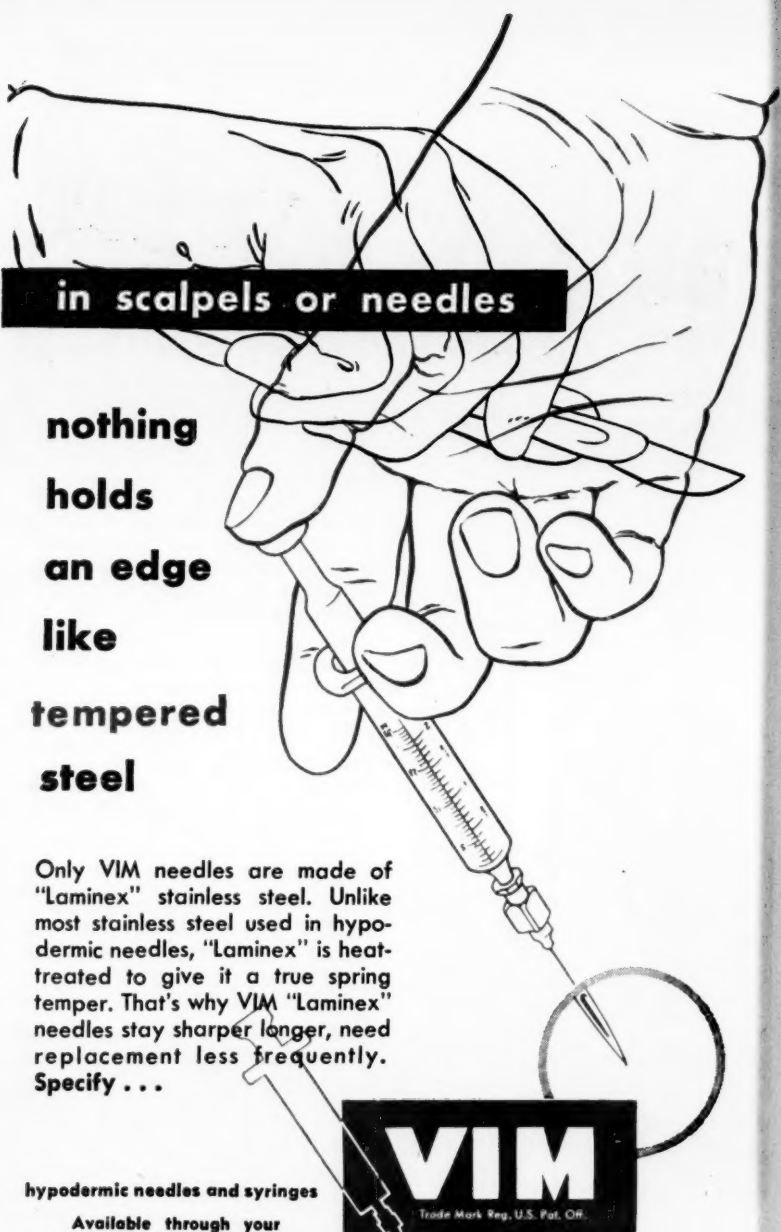


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¹ Council on Pharmacy and Chemistry: J. A. M. A., 135:224. (Sept. 27) 1947.





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Ferrous sulfate is

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Albrecht, F. K.: Modern Management in Clinical Medicine, Baltimore, Williams and Wilkins Co., 1946.

In iron-deficiency anemia, iron, and iron alone, is specific. Feosol Tablets and Feosol Elixir contain adequate dosage of ferrous sulfate—grain for grain the *most* effective and, according to many investigators, the *least* irritating form of iron.

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Contents
for
February 15
1949

VOL. 17, NO. 4



LETTER FROM THE EDITOR.....	12
CORRESPONDENCE.....	16
MEDICAL FILMS.....	21
FORENSIC MEDICINE.....	24
QUESTIONS & ANSWERS.....	36
REFRESHERS IN GENERAL PRACTICE.....	44
SYMPOSIUM ON HEART DISEASE	
Foreword	
Tinsley Harrison.....	53
Acute Rheumatic Heart Disease in Children	
Leo M. Taran.....	55
Prognosis in Heart Disease: Children with	
Rheumatic Fever; Young and Middle-	
aged Men.....	62
Subacute Bacterial Endocarditis	
Leo Loewe.....	63
Treatment of Circulatory Insufficiency	
George R. Herrmann.....	67
Prevalence of Heart Disease: General Trend	
in Young People.....	73
Mortality Trends in Heart Disease: Prognosis	
in Coronary Thrombosis.....	74
Management of Coronary Artery Disease	
Howard B. Sprague.....	75
Pathogenesis and Treatment of Hypertension	
Arthur Grollman.....	79

THE SYMBOL ON THE COVER is now being displayed everywhere throughout the nation because February 14-21 is National Heart Week. The American Heart Association has distributed posters, window stickers, counter cards, plastic hearts, and "Save-a-Heart" banks, all of which carry this official emblem. The Association's campaign for funds and public support began last week and will continue through the month.

Five essentials
accounted for



If baby knew, as physicians do, the importance of adequate quantities of the five vitamins considered essential to good nutrition, he would count his vitamins even more carefully than his toes. For infants, one-half to one average teaspoonful of HOMICEBRIN (Homogenized Vitamins A, B₁, B₂, C, and D, Lilly) will provide the optimal requirements for these five vitamins.

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Contents
for
February 15
1949

CONTINUED

Roentgen Diagnosis of Heart Disease
Merrill C. Sosman..... 82

Recent Progress in Electrocardiography
Clayton J. Lundy..... 88

Right Heart Catheterization in Congenital
Heart Disease
Lewis Dexter..... 92

EXPERIMENTAL MEDICINE

Atheromatosis Produced by Feeding of
Hormones
I. L. Chaikoff..... 96

MEDICAL FORUM

Anesthesia for the Cardiac Patient..... 100

DIAGNOSTIX..... 104

SHORT REPORTS..... 108

WASHINGTON LETTER..... 110

CURRENT BOOKS & PAMPHLETS..... 136

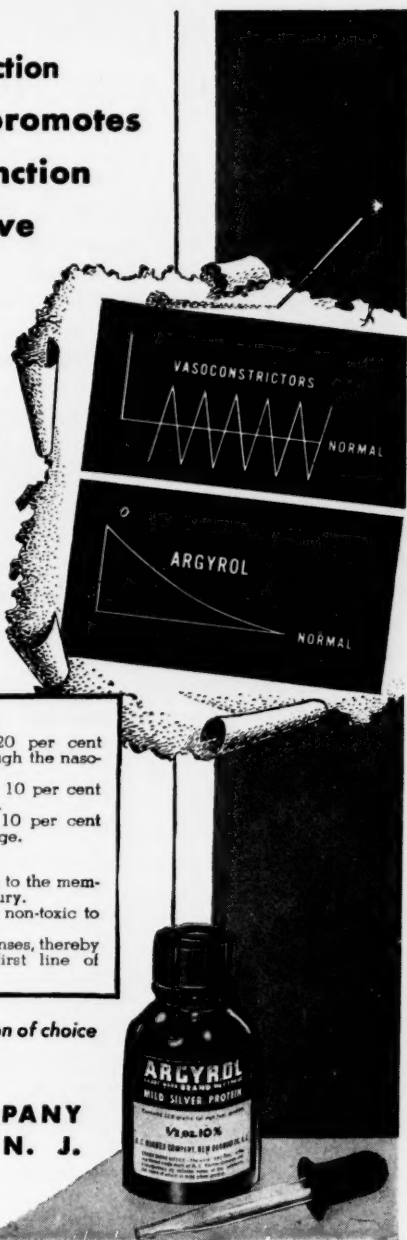
PATIENTS I HAVE MET..... 142

THE CHARTS and statistics on pages 62, 73,
and 74 are adapted from material issued by the
Metropolitan Life Insurance Company, New
York City

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LETTER FROM THE EDITOR

Dear Reader:

Most of you know that the best sources of medical information are medical reports made readily accessible in **MODERN MEDICINE**. Constant readers are well informed. The sometime reader, however, may not see the woods for the trees.

A case in point is a letter we just received from a doctor greatly annoyed by the medical columns in the slick magazines. He said he could pretty well tell when a new issue of a certain popular magazine reached its subscribers by the volume and nature of his phone calls. He said that the day after this particular publication hit the newsstands with an article concerning a new antihistaminic agent he had 30 telephone calls from patients who had hay fever. Each one wanted the new "miracle remedy"!

The doctor suggested that we run a regular department reviewing the advice peddled by the public prints so that he could keep up to date on what his patients were reading.

Aside from pointing out the misinformation, half truths, and conjecture which the medical man would readily recognize anyway, such a department would serve little purpose. It would consist largely of twice-told tales. For the constant reader of **MODERN MEDICINE** would already be acquainted with the drugs and procedures discussed.

Day after day our Editorial Board, Panel of Consultants, and Editorial Staff scour the current literature, hospital and clinic bulletins, and reports from medical meetings and research centers for what is new in diagnosis and treatment. The significant facts that survive the winnowing are then accurately presented in concise, readable reports twice a month in **MODERN MEDICINE**.

The constant reader knows what is new and good. That he adapts to his practice. Wide-eyed reports of panaceas do not bother him, nor his patients. When his telephone rings he has the answer.

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use any syringe
without clogging

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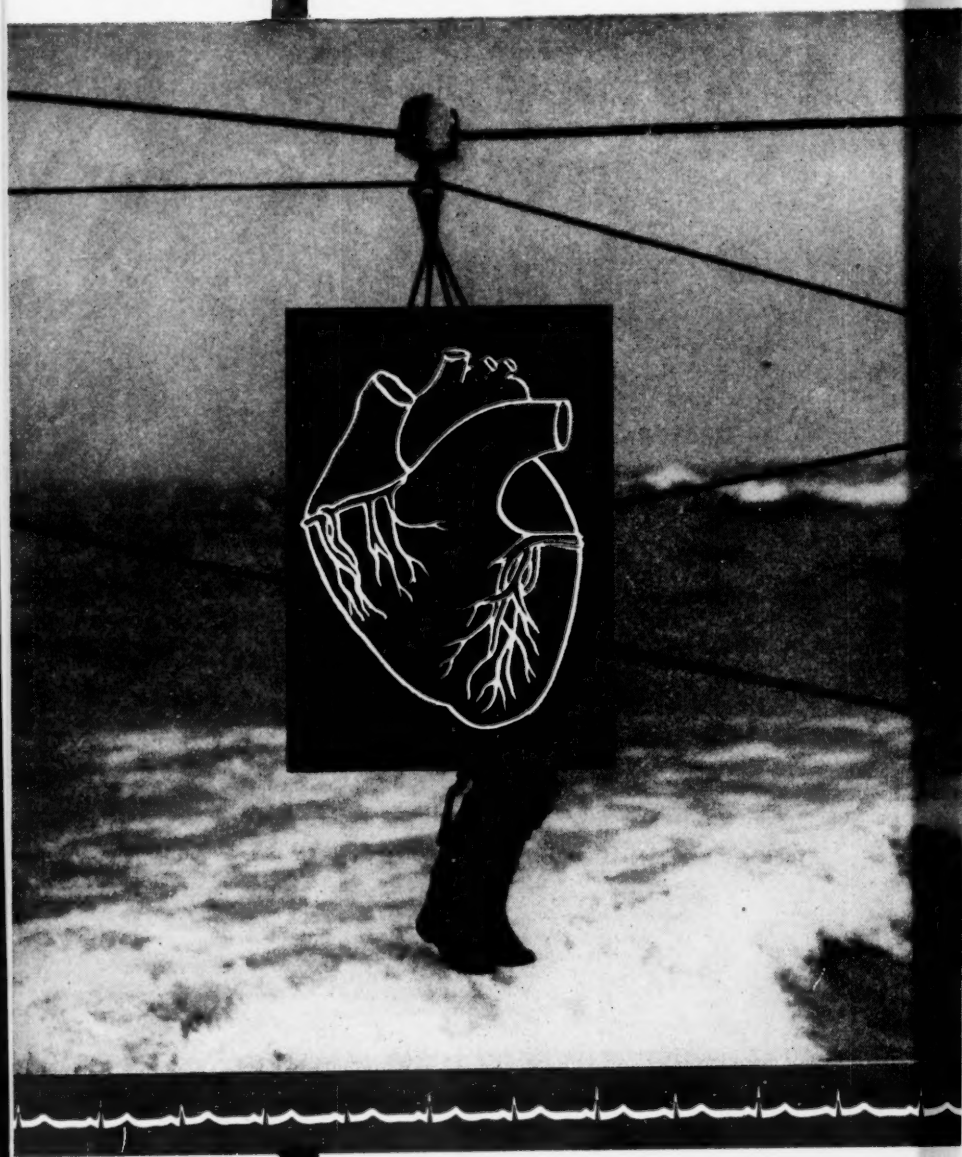
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Correspondence

Communications from the readers of MODERN MEDICINE are always welcome. Address communications to The Editors of MODERN MEDICINE, 84 South 10th St., Minneapolis 3, Minn.

Keeping Informed

TO THE EDITORS: I find *Modern Medicine* a very helpful and instructive journal, particularly in keeping one well informed in fields other than one's own specialty.

WILLIAM MALONEY, M.D.
Oak Terrace, Minn.

Anesthetic Ointment

TO THE EDITORS: In the February issue of *Modern Medicine* (p. 68) you state in a brief abstract of a report by Frank C. Combes, M.D., of New York University: "Anesthetic ointment containing ethyl and amyl aminobenzoate in a fatty base relieves itching and pain of open skin lesions. Discomfort from anal fissures, erosions, and ruptured bullae is quickly ameliorated. Healing of painful varicose ulcers and fissured dermatitis, especially anogenital eczema, is accelerated. Sensitization is rare."

Will you please tell me where the anesthetic ointment which was used in this study can be obtained?

PARKER MARX, M.D.

Chicago

¶Dr. Combes states (*New York State J. Med.*, Dec. 1, 1948, pp. 2599-2600) that the ointment used in his investigation was supplied by Chatham Pharmaceuticals, Inc., of Newark, N. J., and corresponds to their product, Ultracain ointment.—Ed.

Buttonhole Incision

TO THE EDITORS: I have been interested in the recent discussion in *Modern Medicine* about appendectomies. The transverse McBurney skin incision as an approach to the appendix is not new and has been used by such men as W. W. Babcock and his group at Temple University. It offers a variety of advantages over the classical McBurney incision. These advantages are primarily:

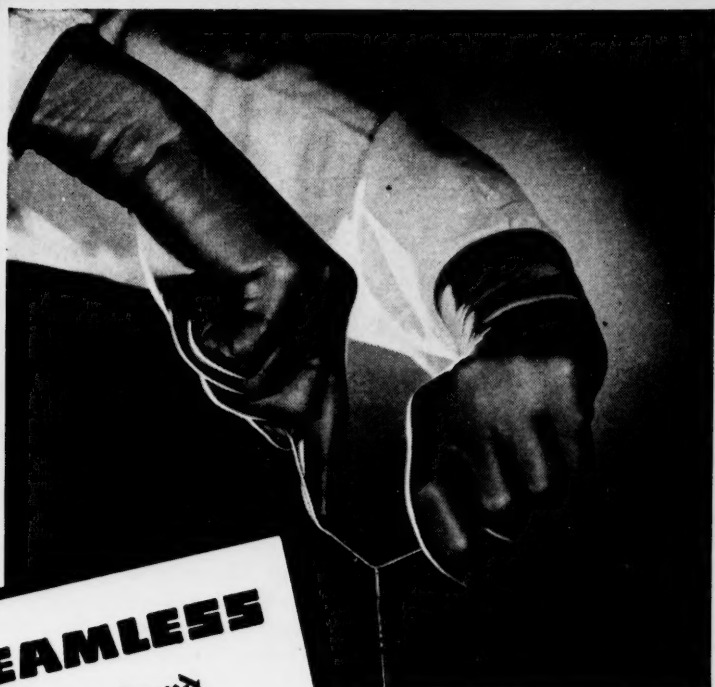
► A shorter period of hospitalization, a smoother postoperative course, and earlier ambulation, thereby avoiding postoperative complications such as urinary retention and gas pains.

► Postoperative incisional hernia is almost unknown.

► Return to normal activity can be accomplished with a shorter period of convalescence.

► Lastly, the scar is hardly noticeable after several months.

This incision is not applicable to all cases, especially if other pathology is suspected in the abdomen. This approach is most successfully used in children, when no other pathology is suspected, and in adult patients when the diagnosis is fairly certain. If other pathology is noticed within the abdomen or the appendix offers some difficult technical problem, the incision can be extended across the abdomen for proper exposure.



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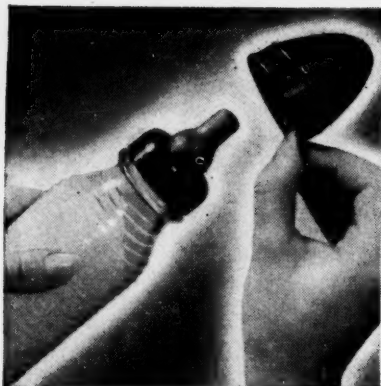
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The technic consists of a small transverse incision $\frac{1}{2}$ in. from the antero-superior spine of the right ileum. The usual length of the incision is about $1\frac{1}{4}$ in. but varies from 1 to 2 in. The underlying external oblique fascia is opened parallel to the direction of its fibers, that is, obliquely. The muscles of the internal oblique transversus abdominis are split and retracted transversely, exposing the peritoneum and the endoabdominal fascia. The muscle may be separated from the peritoneum by finger dissection. This will allow the peritoneum to be brought to the surface. The peritoneum is then incised with bandage scissors at right angles to the fascial opening.

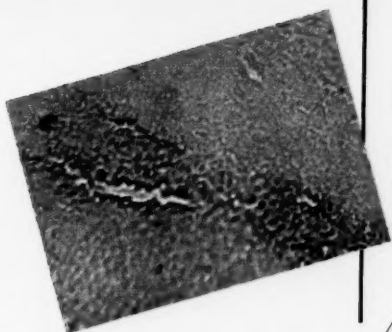
The cecum is located by retracting all the structures of the abdominal wall and is picked up with a Babcock clamp. The tinea is followed by over-and-over clamping of the cecum by the Babcock clamps until the appendix is found. Often the appendix can then be brought up through the abdominal incision, while the excess cecal structures can be returned to the abdomen. The mesoappendix is then clamped and tied and the appendix removed between two clamps by cautery. The appendical stump is doubly tied and buried in the mesoappendical tissue. In female patients finger exploration of the right ovary and adnexia can be done.

The abdomen is then closed in layers. In this method the minimum of gut handling makes for less operative bowel paralysis.

NEIL CASTALDO, M.D.

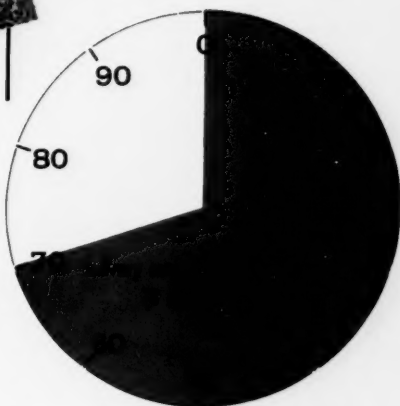
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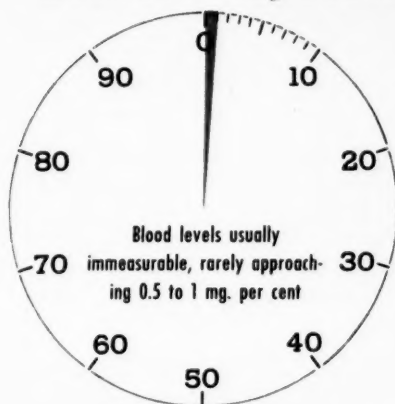


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1. Neiman, I.S.: The Use of a Gum Containing Sulfathiazole to Prevent Infectious Pharyngitis, Arch. Otolaryngol. (in press).
2. Fox, N., Kesel, R.G.: Hyperplastic Sinopharyngostomatitis, Arch. Otolaryngol., 42:368 (1945).

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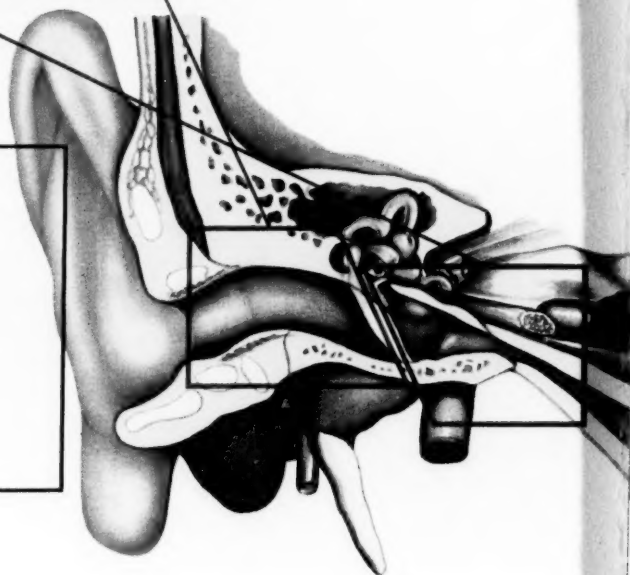
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Currently Available

About three weeks should be allowed for booking because many of these films are in considerable demand. Except when noted, all films are silent and 16 mm. Black and white films are designated b/w, otherwise the film is in color.

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SKELETAL FIXATION BY THE STADER SPLINT: FRACTURES OF THE TIBIA by U.S. Navy. Sound, b/w, 22 min. Sale \$28.56. Castle Films, 445 Park Ave., New York 22.

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DIVIDING CANCER CELLS IN VITRO by W. H. Lewis, M.D., and M. R. Lewis, M.D. Monochrome, 160 ft., 6 min. Rental \$2 per day, sale \$10. Wistar Institute, 36th St. & Woodland Ave., Philadelphia.

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ACTION OF THE EXTRA-OCULAR MUSCLES by U.S. Navy. Sound, 8 min. Sale \$36.01. Castle Films, 445 Park Ave., New York 22.

TUMOR CELLS AND MACROPHAGES IN TISSUE CULTURES by W. H. Lewis, M.D. Monochrome, 360 ft., 13 min. Rental \$3.50 per day, sale \$20. Wistar Institute, 36th St. & Woodland Ave., Philadelphia.

DISEASES OF THE ESOPHAGUS. 650 ft. Rental \$15, sale \$150. Jacques Holinger Memorial Fund, 700 N. Michigan Ave., Chicago 11.

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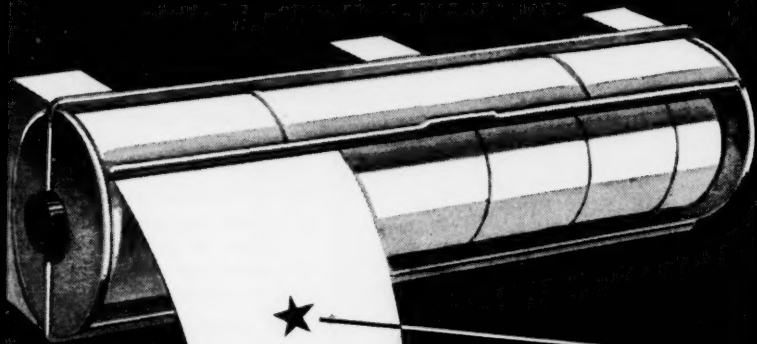


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Curity
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Forensic Medicine

COMPILED BY ARTHUR L. H. STREET, LL.B.

PROBLEM: An injured worker was attended by a doctor provided by her employer or an insurance carrier. Without notifying the employer or the carrier, she engaged another physician, either because she was dissatisfied with the first doctor or because of his absence from town. Under the California workmen's compensation act, was an award covering services of the second doctor proper?

COURT'S ANSWER: No.

The California statute requires an employer to provide his employees with reasonably necessary medical, surgical, and hospital treatment. If such is not provided, the employer is liable for reasonable expense incurred by the worker.

The California District Court of Appeal, First District, decided that in this case neglect to provide medical assistance was not shown. The employer's doctor left town for two months without designating a substitute, but the employee had failed to keep an appointment to see him before he left, no opportunity was given the doctor or insurance carrier to provide a substitute, and there was no proof of emergency.

The court said that even when an emergency exists the employer is not liable for the services of an emergency doctor selected by the employee "covering a long period of time," at least if the employee called the physician without notifying the employer or insurance carrier (192 Pac. 2d, 765).

The court distinguished the case

from an earlier one (151 Pac. 419) in which an award was made for services rendered by a surgeon selected by an injured employee. In the earlier case an employee notified his insurance carrier that he was dissatisfied with the advice of a surgeon provided by the carrier.

The carrier directed the employee to another surgeon who was out of town for an indefinite time. The employee then consulted his own family physician and needed urgent and continuous treatment.

PROBLEM: A physician sold his practice with an agreement not to resume practice for ten years within the same town and surrounding territory. Was he bound by this agreement?

COURT'S ANSWER: Yes.

The decision was rendered by the Iowa Supreme Court. However, the contract should have specified the extent of the surrounding area by radius from the town, or otherwise, since many courts might decide that "surrounding territory" is too vague a term.

But the court strongly intimated that such a contract is not violated by the seller treating patients "in an emergency, and when another doctor cannot be secured" (191 Iowa 1004, 183 N.W. 462).

(Continued on page 28)

PHARMACEUTICALS, BIOLOGICALS, AND BIOCHEMICALS FOR THE MEDICAL PROFESSION



In ARTHRITIS your
patient needs

2 kinds of help

He wants relief from pain or stiffness, and prevention of further damage, SULPHOCOL has provided such help for thousands of arthritic patients.

1. Sulfur, which it supplies in abundance, is essential for detoxification; this limits further damage.
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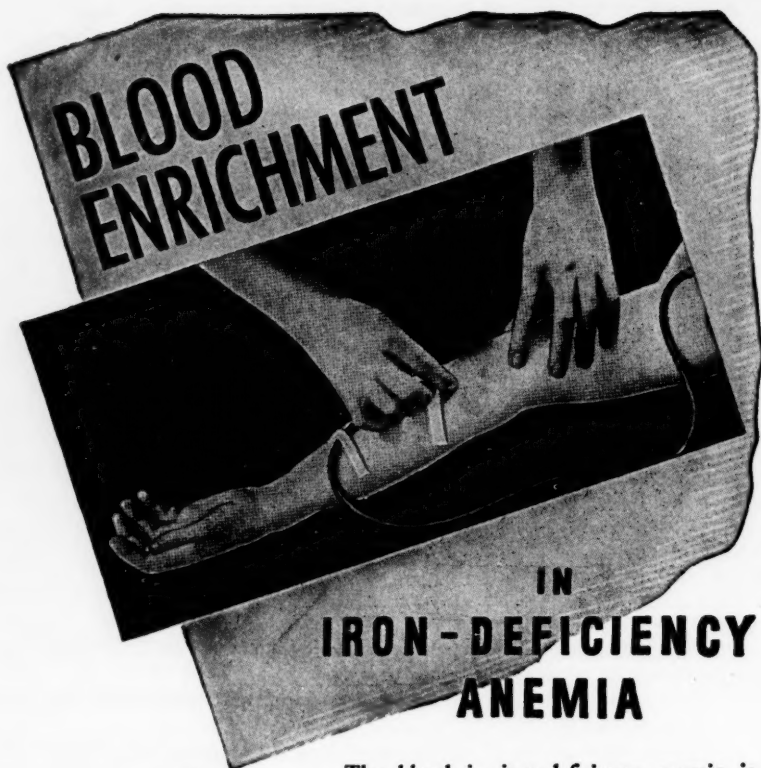
FOR PARENTERAL USE: Sulphocol Sol, 25 cc. vials; 12 and 100-2 cc. vials. $\frac{1}{2}$ to $\frac{3}{4}$ cc. intramuscularly increased to 3 cc. or more.

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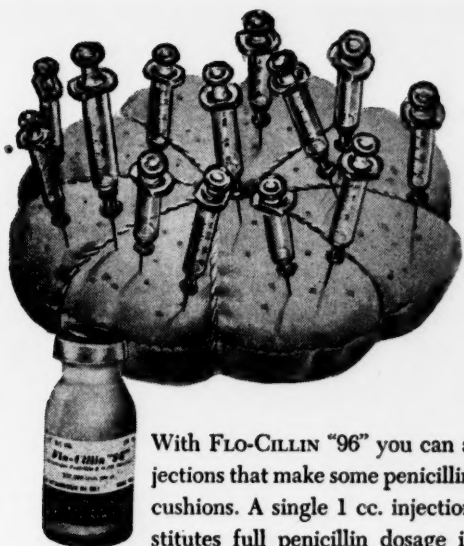
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With FLO-CILLIN "96" you can avoid the frequent injections that make some penicillin patients feel like pin-cushions. A single 1 cc. injection every 48 hours constitutes full penicillin dosage in all but exceptional cases. And this gives ample margin for safety, because this single injection of 1 cc. provides therapeutic blood levels for 96 hours in 90% of patients.

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Professional Sample, Please:

_____ M.D.

In an earlier case the Iowa court upheld the validity of a contract whereby the seller of an established medical practice bound himself for ten years not to reengage in practice in competition with the buyer, a young and recently licensed doctor. The court recognized that it was not unusual for a well-established physician to enjoy a county-wide practice nor unreasonable for a young physician to aspire to extend his practice far beyond his office or home (185 Iowa 848, 169 N. W. 38).

PROBLEM: The chairman of a township board, having been informed by the state board of health of an epidemic in the township, incurred expense to prevent further contagion. This was done without order of the township board, but the bills incurred were audited and allowed by that board. Was the county bound to reimburse the township?

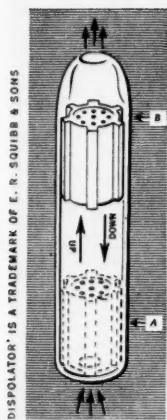
COURT'S ANSWER: Yes.

The Minnesota Supreme Court said that to secure protection of the public, a liberal and sensible view must be taken of the health laws. No technical objection that would prevent enforcement according to the spirit and purpose of the statutory regulations should be allowed. Quarantine and immediate action were necessary. Therefore, the expenses for the public benefit were justified. Under such conditions the town board's act in recognizing the bills was a ratification of the chairman's action in incurring the indebtedness, although it was done without previously granted authority (93 Minn. 134).

¶ However, every doctor who performs services for which he expects to receive any considerable sum should be assured in advance that the public official or board who engages him has legal authority to do so.—A. L. H. S.



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- Disposable** After treatment, the patient throws it away.
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100,000 units crystalline penicillin G sodium

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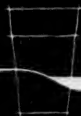
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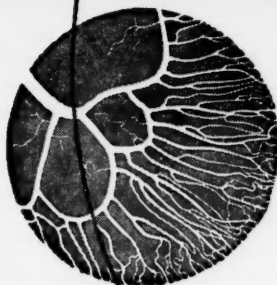
and sodium acid phosphate in purified water.

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the sedation of **PHENOBARBITAL**



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*I*NTENSIVE and continuous research has provided the optimal compromise between stiffness and flexibility in hypodermic needles . . . hyperchrome stainless steel . . . stiff enough to hold a keen, durable point, flexible enough to provide maximum resistance to breakage from bending . . . and never a leaky joint.

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Ammonium Chloride (15 gr.) enteric coated for the treatment of cardiac edema with half the usual number of tablets.

Literature
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1. Grinnell, E.: Journal-Lancet 68: 121 (1948).

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Provides the dermatologic benefits of sulfur in a unique skin-penetrating vehicle which carries the medication to the site of the disturbance, diffusing through the affected cutaneous structures.²

2. MacKee, G. M.; et al.: J. Invest. Dermat. 6: 43 (1945).

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The accelerated, often frantic demands of modern living have increased the incidence of hypertension. Frequently, however, a more normal, often longer life can be achieved through modern medical and nursing management—with diet, rest and the administration of superior medication such as:



THEOBARB WITH MANNITOL HEXANITRATE

Admirably suited to 20th Century therapeutic needs, the basic action of this preparation causes relatively persistent vasodilation of smooth muscles, especially those of the smaller blood vessels including coronaries. Its use, therefore, is indicated in the symptomatic treatment of essential hypertension.

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THEOBARB WITH MANNITOL HEXANITRATE

Each tablet contains:
Theobromine . . . 5 gr.
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**PHARMACEUTICAL CHEMISTS
RICHMOND 4, VIRGINIA**

Questions & Answers

All questions received will be answered by letter directed to the petitioner; questions chosen for publication will appear with the physician's name deleted. Address all inquiries to the Editorial Department, MODERN MEDICINE, 84 South Tenth Street, Minneapolis 3, Minnesota.

QUESTION: What is the most recent treatment for maxillofacial actinomycosis? Is penicillin of value? If so, what is the dosage?

M.D., Florida

ANSWER: *By Consultant in Internal Medicine.* Penicillin is the best treatment for maxillofacial actinomycosis. The period of disability is shortened and sinuses heal more rapidly than with other methods.

Large doses may be given, either 50,000 units intramuscularly every four hours or 300,000 units of the prolonged acting penicillin once daily. Treatment should be continued until signs and symptoms have been greatly diminished or eliminated.

QUESTION: An arthritic patient, sixty-five years old, fractured the surgical neck of her right femur. Impaction seems to be solid. The leg is in a good position but about 1¼ in. shorter. Would you advise surgery or let it heal the way it is? I have enclosed two x-rays.

M.D., Montana

ANSWER: *By Consultant in Orthopedics.* The roentgenograms show upward dislocation of the shaft of the femur in its relationship to the head, indicating that the neck of the femur has fractured.

It is not likely that healing of the fracture has taken place or will take place. In the usual case the hip be-

comes progressively more painful. After several weeks have elapsed since the fracture, reduction can no longer be obtained. The advisable procedure would be to osteotomize the trochanteric area in order to place the neck in a valgus position, as this will sometimes secure healing of the fracture.

QUESTION: A patient, seventy, walks into the office with urgent dyspnea. Sonorous rales are heard all over the chest. Breathing does not appear to be of the usual asthmatic form. Attacks began at about the age of sixty. He claims that dyspnea occurs mostly on walking and is worse after sundown. Chest roentgenogram shows lung and heart normal. Kahn, negative; pulse, 90; blood pressure, 130/80; hemoglobin, 80. Assuming the diagnosis to be asthma associated with a weak heart, emphysema, and chronic bronchitis, what therapy would be best for immediate relief?

M.D., Michigan

ANSWER: *By Consultant in Internal Medicine.* Assuming that the condition is chronic asthmatic bronchitis with pulmonary emphysema and myocardial insufficiency, aminophylline or a combination of aminophylline and ephedrine may be used. Intravenous aminophylline may be given for the acute attacks. Digitalis may be indicated for the myocardial insufficiency.

(Continued on page 40)

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with*

SECURITY

IN

HYPERTENSION

complicated by Increased
Capillary Fragility

Guard Against
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by prescribing

RUZAN

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Same formula but
1/4 gr. phenobarbital



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Phenobarbital (0.5 gr.)—for sedative and relaxant value.

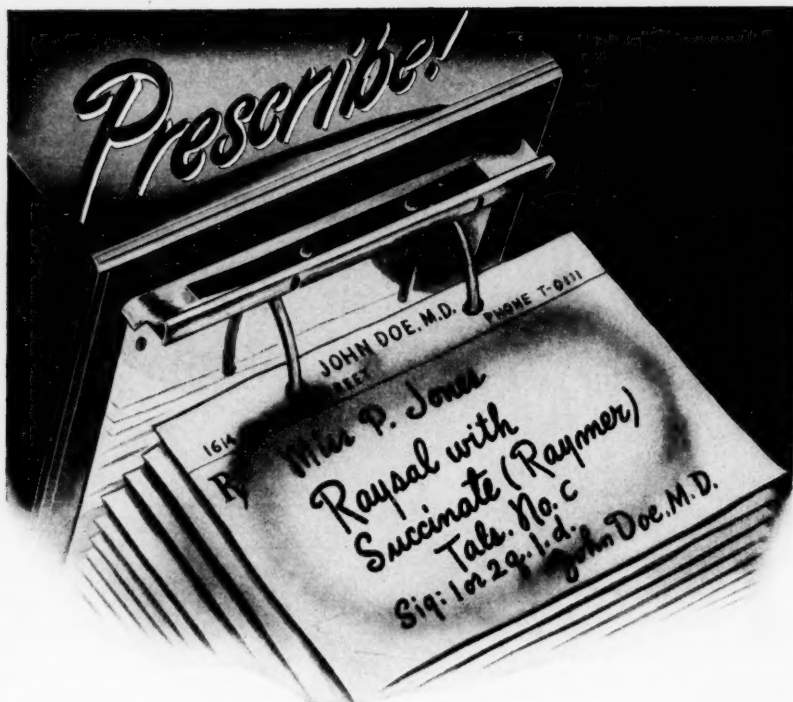
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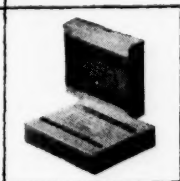
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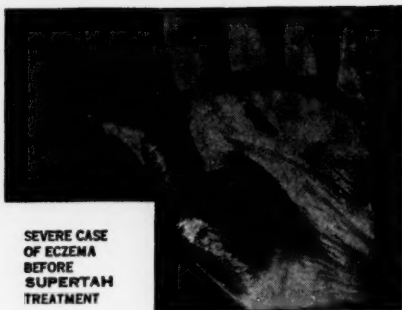
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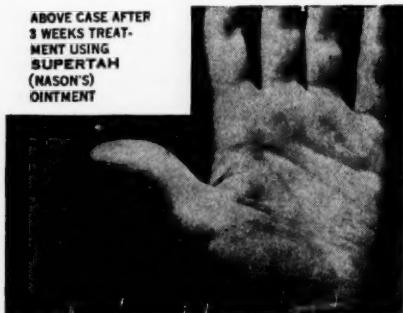
- Does not burn or irritate the skin*.
- Does not stain linen, clothing or skin.
- Does not have to be removed before each fresh application.
- DOES everything crude coal tar ointment will do.

*Swartz & Reilly, "Diagnosis and Treatment of Skin Diseases," page 66

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2-oz. jars. (5% & 10% strength)



ABOVE CASE AFTER
3 WEEKS TREAT-
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(NASON'S)
OINTMENT

QUESTION: What is the value for practical heart diagnosis in using unipolar leads and V₁-V₆ multiple precordial leads combined with standard leads when regular standard leads I, II, III, IV F, CF, CF₆ give the same diagnostic results as far as cardiac lesions are concerned? If the precordial leads are obligatory, what are the real indications? Which method is preferable?

M.D., Massachusetts

ANSWER: By Consultant in Cardiology. Indications for the use of chest leads were thoroughly covered in the abstract of the article by Dr. Frank N. Wilson of the University of Michigan (*Modern Medicine*, Dec. 15, 1948, p. 35).

No new standards for the use of chest leads have been established by the American Heart Association since 1943. Most internists still rely on the standard leads plus some of the chest leads for general use.

It is believed, however, that the unipolar leads and augmented extremity leads will be accepted generally and be used routinely within the next few years.

QUESTION: Will you please tell me the liters of oxygen per minute to administer through nasal catheters for carbon monoxide poisoning and for respiratory failure during anesthesia?

M.D., Virginia

ANSWER: By Consultant in Anesthesiology. For carbon monoxide poisoning, 5 to 8 liters should be given per minute, guided by the favorable effect upon pulse.

A nasal catheter is of no value for respiratory failure in anesthesia, unless good artificial respiration is carried on at the same time. The best method is to use a tight fitting mask or endotracheal tube and an oxygen bag so that the lungs may be rhythmically expanded.



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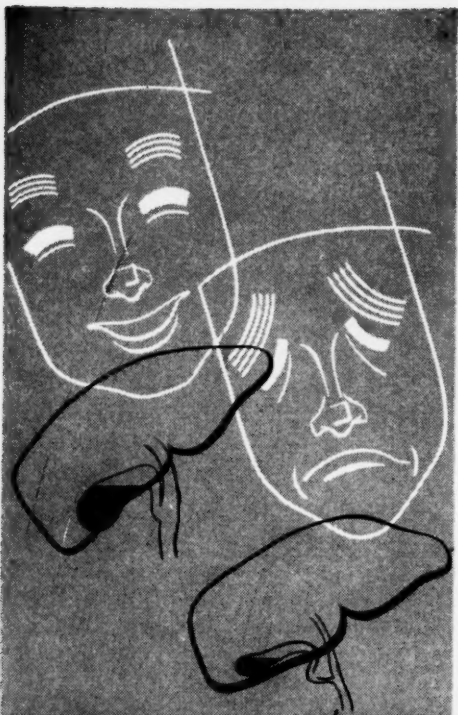


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Joy prompts a moderate increase in the flow of bile. Anger stops the flow. Strong loathing can contract the biliary system and even back-pressure bile into blood vessels.

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Ketocholanic Acids,
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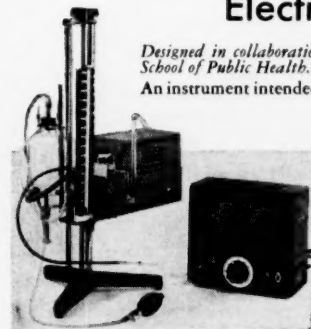
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Refreshers in General Practice

This department comprises material excerpted by W. R. Feasby, M.D., Executive Editor of Modern Medicine of Canada, from his new book Medical Manual published by the University of Toronto Press, Toronto, Canada.

Low-Sodium Diet

This diet contains approximately 880 mg. of sodium per day and 1,800 calories. Sodium is to be eliminated as completely as possible from the diet. Thus common salt (sodium chloride), baking soda (sodium bicarbonate), and baking powder cannot be used in the preservation, preparation, cooking, or serving of foods. In addition, certain foods are naturally high in sodium and must be limited or excluded. Only salt-free butter and bread are used.

BREAKFAST:

Fruit, 1 serving of any listed below
Cereal, cooked, 1 small serving
Egg, 1
Bread, 1 slice
Butter, 1 tsp.
Milk, $\frac{1}{2}$ cup

DINNER:

Meat, 1 serving of lean beef, lamb, chicken, or fresh-water fish
Potato, 1 medium-sized
Vegetable, 1 serving from list below
Bread, 1 slice
Butter, 2 tsp.
Dessert, made from tapioca, rice, cornstarch; or fruit, 1 serving from list below
Cream or milk for tea
Fruit drink, from any fruit listed below.

LUNCH OR SUPPER:

Meat, 1 serving of lean beef, lamb, chicken, or fresh-water fish; 2 eggs may be used occasionally
Potatoes, macaroni, spaghetti, noodles, or rice, 1 serving
Vegetable, 1 serving from list below
Milk, 6 oz.
Bread, 1 slice
Butter, 1 tsp.
Fruit, 1 serving from list below

BEDTIME:

Bread, 1 slice
Butter, 1 tsp.
Milk, 6 oz.

VEGETABLES ALLOWED:

Asparagus	Mushrooms
Beets	Parsnips
Broccoli	Peas
Brussels sprouts	Potatoes, white or sweet
Cabbage	String beans
Cauliflower	Squash
Corn	Tomatoes
Cucumber	Tomato juice
Lettuce	

FRUITS ALLOWED:

Apples	Cranberries
Apricots	Gooseberries
Bananas	Grapefruit
Blueberries	Grapes
Cherries	Lemons

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BIBLIOGRAPHY: (1) Modell, W.; Gold, H., and Clarke, D. A.: *J. Pharmacol. & Exper. Therap.* 84:284, 1945. (2) Gold, H., and others: *Am. J. Med.* 3:665, 1947. (3) New and Nonofficial Remedies, Philadelphia, J. B. Lippincott Co., 1947, p. 298. (4) Finkelstein, M. B., and Smyth, C. J.: *J. Mich. State M. Soc.* 45:1618, 1946. (5) Reaser, P. B., and Burch, G. E.: *Proc. Soc. Exper. Biol. & Med.* 63:543, 1946. (6) Griggs, D. E., and Johns, V. J.: Influence of mercurial diuretics on sodium excretion, to be published.

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1. Zilversmit, D. B., Entenman, C. and Chaikoff, I. L., The Measurement of Turnover of the Various Phospholipids in Liver and Plasma of the Dog and Its Application to the Mechanism of Action of Choline, *J. Biol. Chem.* 176:193, 1948.
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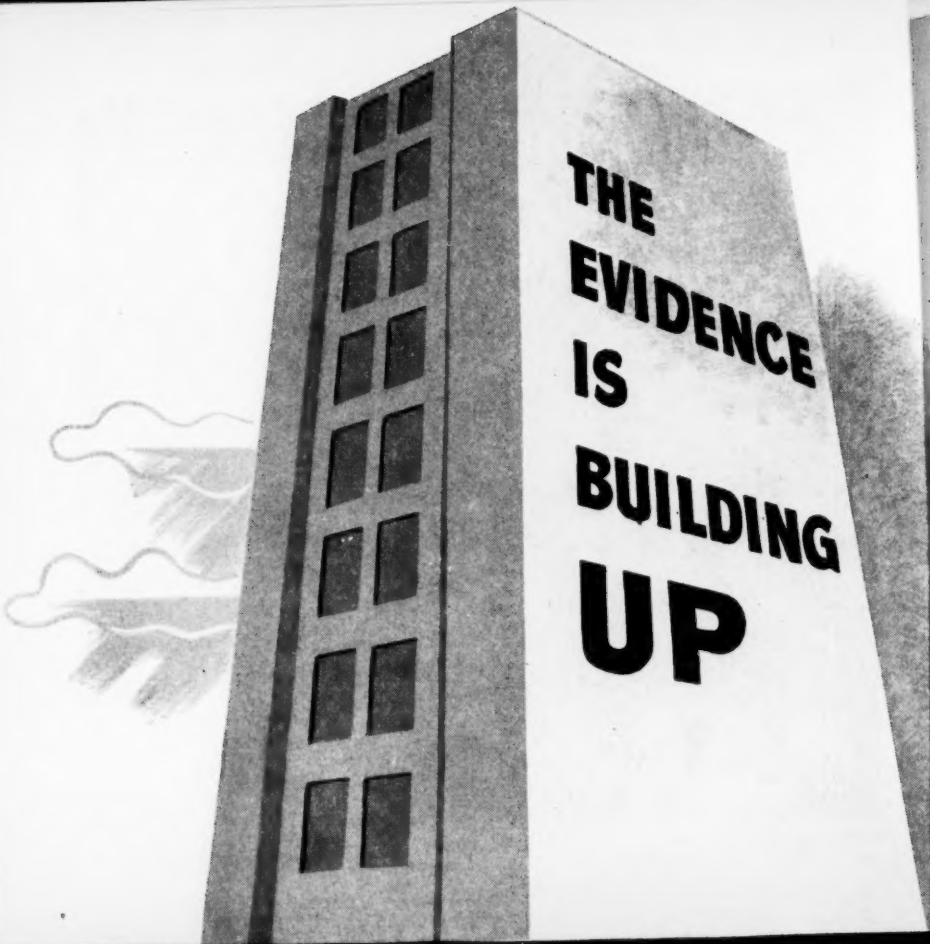
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1. Levin, S. J., and Moss, S. S.: *Hydryllin in Asthma and Hay Fever*, J. Michigan M. Soc. 47:869 (Aug.) 1948.

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2. Brown, E. B., and Brown, F. W.: *The Use of a New Antihistaminic Combination [Hydryllin] in the Treatment of Allergic Disorders*, New York State J. Med. 48:1465 (July 1) 1948.

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3. *Report of the Committee on Therapy to the American Academy of Allergy*, St. Louis, Dec. 15-17, 1947.

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Foreword

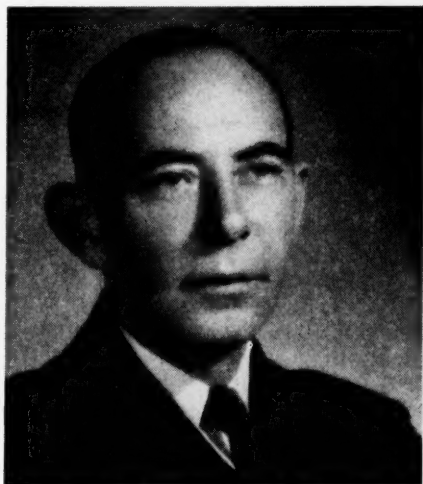
President, American Heart Association

TINSLEY HARRISON, M.D.

IT is fitting that a medical journal with wide circulation publish at this time a Special Heart Symposium. The editors have arranged that this symposium shall appear concurrently with the first national fund-raising drive of the American Heart Association.

For the benefit of those readers who are not acquainted with the objectives and purposes of the American Heart Association, the following brief summary of its history and purposes may be of interest.

For more than twenty years this organization was concerned entirely with scientific activities such as the publication of the *American Heart Journal* and *Modern Concepts of Cardiovascular Disease*, with the presentation of a yearly program, and with setting standards for cardiac clinics. For such purposes few funds were needed and practically none were available, but



Tinsley Harrison, M.D.

nevertheless useful service was rendered by the Association.

About three years ago the decision was made to expand the American Heart Association into a national voluntary health agency, for the purpose of assuming a more active role in combating the cardiovascular diseases. This objective remained a pipe dream until a stroke of good fortune came through the generosity of the Proctor and Gamble Company and Mr. Ralph Edwards, of "Truth and Consequences" fame. The funds obtained from the "Walking Man" radio program in 1948 made it possible to undertake seriously the new and broader objectives.

The permanent staff of the American Heart Association was expanded to provide the finest type of leadership and to make available to local areas the most expert opinions concerning local heart programs. At the same time organizational activities were undertaken in order to create numerous additional local heart associations. These will have as their primary function the objectives of service and education, plus the encouragement and support of research in suitable communities.

A large fraction of the funds of the American Heart Association will be utilized to support research. It is planned to do this mainly through making possible the continuance of careers for individuals who display unusual ability in this field. The emphasis will, therefore, be primarily on the support of people rather than of projects.

Acute Rheumatic Heart Disease in Children

LEO M. TARAN, M.D.*

St. Francis Sanatorium for Cardiac Children, Roslyn, L. I.

Prepared for Modern Medicine

THE clinical and pathologic relationship of acute heart disease and rheumatic fever was demonstrated conclusively by Bouillaud over one hundred years ago. The prognosis in rheumatic disease, however, until about fifty years ago, was based almost entirely upon the state of the valves. As late as 1924, Drs. Cohn and Swift¹ stated that it was not possible to say, during the course of the acute stage of rheumatic fever, whether heart disease was likely to be established. They were of the opinion that long periods of time often pass after the acute phase of rheumatic disease before the diagnosis of heart disease becomes apparent.

In recent years, interest has moved from the study of valvular damage to that of acute heart disease. It became apparent that acute carditis is the most frequent, the most insidious, and the most damaging manifestation of rheumatic fever. And despite the great increase in knowledge of the natural history of rheumatic disease and its cardiac manifestations, no clear-cut criteria have been forthcoming for the diagnosis of mild carditis.

No criteria have been established for determining when rheumatic carditis is present and when it has finally

ended. Furthermore, it is our experience that rheumatic carditis in children is almost the only unfailing expression of rheumatic activity. Thus, criteria for screening rheumatic carditis assume even greater importance in the diagnosis of acute rheumatic disease in children.

In the past ten years detailed observations on large numbers of children with acute rheumatic heart disease were made at St. Francis Sanatorium for Cardiac Children under adequately controlled conditions. Actually more than 5,000 patient years were observed in over 1,500 children. Many important lessons with regard to acute rheumatic heart disease were learned.

Of these, the first and most significant was that acute rheumatic heart disease is not as clear-cut a clinical entity as one is led to believe from the textbook description of the disease. At both ends of the so-called "classical" phase of the disease, rheumatic carditis can be demonstrated in a large number of cases. It is clear that acute rheumatic heart disease begins long before the appearance of the accepted clinical and laboratory diagnostic criteria described in the literature and continues for months after their disappearance.

* Associate in Pediatrics and Chief, Children's Clinic, King's County Hospital; Medical Director, St. Francis Sanatorium for Cardiac Children, Roslyn, L. I.; Chief, Children's Cardiologic Clinic and Associate Cardiologist, Beth Israel Hospital, New York City.

The second lesson was that mild carditis in the subclinical phase, when the usual clinical and laboratory criteria are absent, must be treated with the same concern as the acute explosive phase. Progressive cardiac damage is certain to occur during the smoldering phase of the disease if the condition is regarded as quiescent and the patient is permitted to assume normal activities.

Finally, our observations showed that acute rheumatic heart disease in children cannot be treated as a single entity. It became clear that this phase of rheumatic disease consisted of various stages which are distinct in their manifestations and usually follow each other in sequence.

These lessons stimulated the search for further diagnostic criteria of acute carditis in the hope of detecting the presence of early and mild rheumatic carditis and avoiding the error of terminating medical care before actual quiescence. In addition, it was felt that more sensitive diagnostic criteria would give us a better yardstick for measuring the degree and progress of acute carditis, since the usual clinical and laboratory criteria failed in many instances to evaluate the severity of the disease.

DIAGNOSTIC CRITERIA OF ACUTE CARDITIS

History—Early in these studies it became clear that even a most careful history of the patient's illness failed to detect the presence of mild carditis. The account of early rheumatic symptoms alone, such as repeated abdominal pain, epistaxis, and migratory muscle and joint pain, varies greatly with the personality of the patient and historian and cannot be relied upon

in screening cases of carditis in the latent and so-called quiescent phases.

Laboratory evidence—Blood studies, including the sedimentation rate, immunologic studies, and the usual fever curve and pulse rate records are notoriously misleading. Carditis may exist while the sedimentation rate, blood count, temperature and pulse rate, and antistreptolysin and antifibrinolysin titers are normal. Furthermore, many a child has unjustifiably been convicted of acute carditis because of a low-grade fever and an elevated sedimentation rate.

Clinical picture—Pediatricians have long been familiar with the clinical picture of rheumatic carditis. The rheumatic child who retires voluntarily from vigorous physical activity, is highly unstable emotionally, and becomes progressively pale without a parallel drop in hemoglobin usually suggests to the trained pediatrician a definite disturbance in cardiac action. The heart action sounds tumultuous; the pulse is labile. Although no evidence of cardiac insufficiency may be present, reaction to usual exercises produces more than usual fatigue.

Although this clinical picture is of great help in detecting early and mild carditis in children, students of rheumatic fever feel that recognition requires considerable experience.

Cardiac findings—Cardiologists, on the other hand, contend that the clinical picture alone is insufficient evidence of carditis. Definite cardiac findings must be present to warrant such a diagnosis. The presence of progressive valvular disease is, in some quarters, considered good evidence of carditis. This is a disputed issue. Some investigators feel that progressive valvular disease may be the result of cic-

atrization occurring during the period of quiescence. In our experience, progressive endocarditis in children and young adults is nearly always associated with acute carditis.

Opinion is unanimous among clinicians that progressive cardiac enlargement in rheumatic children is an unfailing sign of acute carditis. Some rheumatologists feel that a quiescent rheumatic heart will resist dilatation and hypertrophy whatever the extent of valvular damage. Furthermore, vigorous physical exercises do not increase the size of the quiescent rheumatic heart.

Our observations concur completely with these findings. Progressive cardiac enlargement in rheumatic children can always be shown to be associated with acute carditis. This diagnostic criterion, however, has an important drawback. Slight cardiac enlargement is difficult to detect and requires frequent roentgenologic study, and the best roentgenographic method of studying cardiac size presents a high degree of error.

There is no disagreement on the observation that in rheumatic children and young adults congestive failure occurs only in the presence of acute carditis. Congestive heart failure, therefore, even in the absence of all other criteria of acute carditis in the young rheumatic patient, confirms the diagnosis of acute heart disease. This diagnostic criterion, however, is a late finding and therefore infrequently seen—9 out of every 10 children with early carditis do not show evidence of congestive failure.

The clinician of twenty-five years ago looked with great concern upon the rheumatic patient who was refractory to cardiac therapy. He sus-

pected that rheumatic activity was present in such cases. There is now no agreement upon this concept. Some cardiologists believe that cardiac therapy is a highly specialized form of treatment and that therapeutic results are difficult to evaluate. We are much impressed with the fact that most of the currently proposed forms of cardiac therapy, even when meticulously executed, fail to produce the expected results in patients with acute carditis and congestive failure.

A poor response to cardiac therapy in rheumatic patients, therefore, may be used as a diagnostic criterion for acute carditis. Here again, although this criterion can be relied upon in making a diagnosis of acute carditis, it misses the larger number of cases of carditis without congestive failure.

Electrocardiographic findings—In recent years this field has been extensively, yet inconclusively, explored with the aid of the electrocardiograph. Considerable difference of opinion, however, exists with regard to the frequency of electrocardiographic abnormalities in patients suffering from acute rheumatic disease, the incidence ranging from 22 to 100% in various studies.²

A critical review of the literature emphasizes the fact that the electrocardiogram cannot be used as a specific diagnostic test for rheumatic carditis. The evidence presented is, in the main, of three sorts: [1] The duration of the A-V conduction time is increased, though not always; [2] there is frequent alteration in the ventricular complex, either of the QRS, the S-T segment, or the T wave; and [3] irregularities occur in cardiac rhythm.

It is pointed out that most electro-

cardiographic findings are transient and bear no clear-cut relation to clinical findings. Some alterations become fixed and cannot, therefore, be used as criteria. Most electrocardiographic abnormalities described demonstrate evidence of temporary ischemia or permanent scar formation of the cardiac muscle. These findings seem to point to an inadvertent attempt to correlate electrocardiographic findings with histopathology of rheumatic myocarditis. Few studies take into clear account the pathologic physiology mirrored in the cardiogram of the acutely inflamed heart muscle.

Physiologists have always contended that disturbance in time relationship of systole and diastole is a manifestation of impairment of the functional integrity of the myocardium. Wiggers and Clough³ found consistently that the period of systole was of longer duration in functional cardiac disorders. They made the observation that when more blood returns to the ventricle, it responds by expelling more blood, not only by a greater number of ejection periods, but also by a greater relative duration of each systole.

Katz⁴ has stated that the duration of the systole in the diseased heart as compared with the normal heart would give a method of determining the functional integrity of the myocardium. Bazette⁵ concluded that the duration of the systole in the abnormal heart may prove a measure of dilatation.

The application of this physiologic principle in the study of rheumatic carditis in children and young adults is rewarded by a much clearer understanding of the disease. Our experience would seem to show that the

disturbance in the relationship of systole to diastole in the cardiac cycle is of great diagnostic and prognostic significance. Adequately controlled studies in large numbers of rheumatic children present the following findings:

1] The duration of electrical systole (QT), both absolute and relative to diastole, is significantly prolonged in all cases of carditis.⁶

2] This prolongation of electrical systole is a function of the severity of carditis and not of the cardiac rate.⁶

3] This disturbance in relationship of systole to diastole occurs weeks and often months in advance of clinical and laboratory evidence of carditis.

4] A continued prolongation of the electrical systole relative to diastole, after all clinical and laboratory evidence of acute carditis, has, in our experience, proved to be a sign of mild carditis.

5] Our observations also show that a close relationship exists between the duration of electrical systole and the extent of cardiac damage resulting from acute carditis. Furthermore, the longer the electrical systole remains abnormally prolonged, the more extensive the total cardiac damage.

CLASSIFICATION OF PHASES

Acute rheumatic heart disease falls broadly into two main categories: the stage during which the heart is actively disturbed but does not show any evidence of depletion of cardiac reserve, and the phase of obvious congestive heart failure⁷ (see table).

Invasion stage—At the onset of carditis, the acute phase is dominated by the usual toxic manifestations of rheumatic fever. The patient is extremely pale and weak and has fever, marked

perspiration, and cold clammy skin. There is a high degree of emotional disturbance, such as anxiety, restlessness, capricious appetite, irritability.

The child is likely to show other rheumatic manifestations. He usually has arthritic manifestations and various skin manifestations, such as erythema marginatum. The usual laboratory tests, including erythrocyte

sedimentation rate, white blood count, and hemoglobin determination, which are thought to contribute to the diagnosis of rheumatic fever, are in most instances positive.

On the cardiovascular side, there are few obvious findings. The child has a tachycardia, complains occasionally of fatigability, and has a slight decline in systolic pressure. There is

ACUTE RHEUMATIC HEART DISEASE IN CHILDREN *

Clinical Manifestations	Cardiac Functional Disability		Congestive Heart Failure			
	Invasion stage	Smoldering phase	Left heart failure	Right heart failure	Left & right heart failure	"Irreversible" heart failure
<i>Toxic</i>						
Fever, pallor	♦	◊				♦
Weakness, cold and clammy skin	♦					♦
Anorexia, vomiting	♦					♦
Anxiety, restlessness	♦		◊		◊	♦
Other rheumatic manifestations (muscle, joint, skin)	♦	◊				◊
<i>Cardiovascular</i>						
Heart rate (tachycardia)	♦	♦	◊	◊	◊	♦
Fatigability	◊	♦	♦	◊	◊	♦
Angina		◊	♦		♦	♦
Dyspnea and/or orthopnea			♦		♦	♦
Abdominal and gastrointestinal symptoms				♦	◊	♦
Dependent edema				♦	♦	♦
Labile pulse	◊	♦	♦	◊	♦	♦
Rhythm disturbance (crude)	◊		◊	◊	◊	♦
Blood pressure	Decrease	Rise	No Change	No Change	No Change	Rise
Vital capacity (decrease)		2+	4+	1+	2+	4+
Ventilation (increase)		1+	4+	1+	2+	4+
Venous pressure (increase)				4+	2+	4+
Circulation time (increase)		2+	1+	2+	2+	4+
Cardiac enlargement		1+	1+	2+	2+	1+
<i>Laboratory</i>						
Elevated ESR; increased WBC; depressed RBC and Hb	♦	◊	◊			
<i>Electrocardiographic</i>						
Conduction disturbance A-V	♦	◊				◊
Prolonged QTc	♦	♦	♦	♦	♦	♦
Local tissue anoxia - ST	◊	♦				◊
Myocardial disturbance - T			♦	♦	♦	♦
Ventricular strain - left or right					♦	♦
Disturbance in rhythm						♦

♦ Usual, ◊ Occasional, 1+ Slight, 2+ Moderate, 4+ Marked

* J. Pediat. 33:226-241, 1948.

no change in the circulation time and no increase in venous pressure. The heart does not show progressive cardiac enlargement. On the other hand, 9 of every 10 patients exhibit a disturbance in conduction time on the electrocardiogram, and all patients show a very definite prolongation of the systolic time on the electrocardiogram.

Smoldering phase—Once the acute toxic phase is passed, the patient settles down to a long-drawn-out, usually low-grade carditis. During this period very few toxic manifestations are present. The temperature usually is normal. Pallor is greater than the hemoglobin would warrant but is not as intense as in the stage of invasion. The diagnosis is often uncertain since results of the usual laboratory tests may remain normal for months while the activity of the disease continues.

On the other hand, more definite manifestations of cardiac functional disability begin to accrue. The heart presents a tumultuous cardiac rhythm with a sinus tachycardia. The child occasionally complains of anginal pain and easy fatigability. On examination, the pulse rate is found to be labile. The blood pressure is usually higher than would be expected. There is a moderate decrease in vital capacity and an increase in respiratory rate and ventilation.

Repeated roentgen examinations show progressive cardiac enlargement. The electrocardiogram always shows a distinct disturbance in the relationship between electrical systole and diastole. The Q-T interval is always markedly prolonged. The diastolic period is, therefore, very much shortened. The heart works under a false economy of a prolonged contraction

time impaired by a markedly shortened relaxation time.

In most instances, when this sequence of events continues unabated, the electrocardiogram begins to show signs of local tissue anoxia. There are, however, no obvious signs of depletion of the cardiac reserve, no dyspnea, and no orthopnea. The venous pressure is normal and the blood velocity within usual limits.

Left heart failure—At this stage, many symptoms of cardiac involvement become manifest. Easy fatigability is noted. There are frequent attacks of angina and various degrees of dyspnea or orthopnea. Although the toxic manifestations of rheumatic fever are not prominent, undoubted signs of acute carditis are present on examination. The pulse rate is labile. Rhythm is occasionally disturbed and from time to time a distinct gallop rhythm is heard. Vital capacity is usually markedly decreased and the ventilation markedly increased. The blood circulation time is occasionally prolonged, although the venous pressure in most instances is normal.

The heart is always enlarged. The electrocardiogram shows an ever present disturbance in the systolic-diastolic relationship as well as myocardial disturbance. T-wave changes in the limb and in the precordial leads are frequent findings.

Right heart failure—Pure right heart failure is rarely seen with rheumatic heart disease in children. When it does occur, it is rather striking, in that the child has an enlarged liver, edema, and occasionally facial edema, without any signs of respiratory distress. The majority of patients do not demonstrate any toxic manifestations of rheumatic disease. The laboratory

tests are usually normal for acute infection but many signs and symptoms of cardiac failure are present.

In this phase, the gastrointestinal symptoms are more likely to dominate the scene. There is nausea, vomiting, disturbances in evacuation, frequent upper abdominal pain, and distention.

The pulse rate is labile. The blood pressure is normal and ventilation but slightly increased. The vital capacity may be decreased only slightly. Venous pressure is raised, blood circulation time delayed, and the heart moderately enlarged. The electrocardiogram shows the usual disturbance of the relationship of systole to diastole and evidence of myocardial damage, particularly by changes in the T-wave.

Left and right heart failure—At this stage few manifestations of the toxic rheumatic disease appear. There are, frequently, complaints of precordial pain, often typically anginal. At other times the precordial distress is of an indefinite nature—diffuse precordial annoyance and a feeling of constriction. The patient shows the manifestations of respiratory distress and of right heart failure. Dyspnea, orthopnea, and occasional gastrointestinal symptoms occur.

The venous pressure is raised and the circulation time delayed. Vital capacity is low and ventilation high. The heart becomes markedly enlarged. The usual electrocardiographic findings are those of ventricular strain, either right or left. In addition, clinical evidence of carditis continues. The pulse is labile, the heart tumultuous, and there is frequently a marked gallop rhythm. Occasional crude disturbances in rhythm are observed besides a marked tachycardia.

"Irreversible" stage—At this phase, there is a distinct and rather dramatic return of all the toxic manifestations of rheumatic disease. A low-grade, fluctuating fever and marked pallor appear. The patient once again complains of extreme weakness, cold sweats, and cold, clammy skin and shows marked anxiety and restlessness. Joint swellings recrudescence with many bizarre rheumatic skin manifestations, a marked tachycardia, and extreme cardiac fatigue. The patient often has acute attacks of angina, some of which are long lasting and difficult to control with sedation.

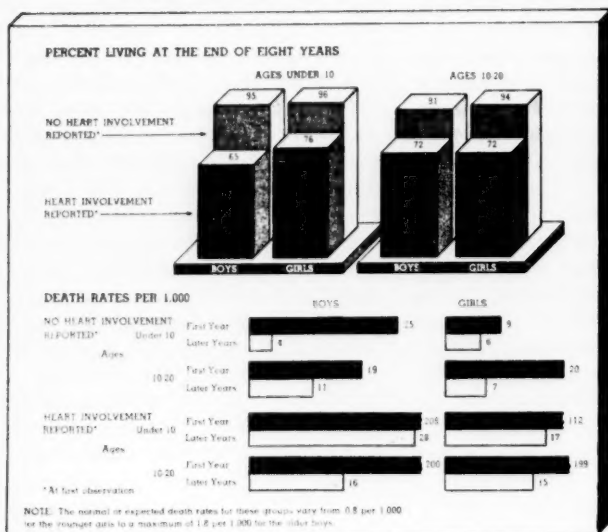
Dyspnea and orthopnea are severe. The liver is much enlarged. The upper abdomen is tender, and there is usually a high degree of edema and ascites. Most patients show a considerable rise in systolic and venous blood pressures, a great delay in circulation time, pronounced depression in vital capacity, and an increase in ventilation sometimes reaching as much as 10 liters per minute per square meter of body surface. The heart is distinctly enlarged.

The electrocardiogram may show any or all the abnormalities already mentioned. Many patients also show crude disturbance in rhythm, such as auricular fibrillation, premature ventricular contractions, and the like. All patients have a prolonged systolic period on the electrocardiogram and a shortening of the diastolic period.

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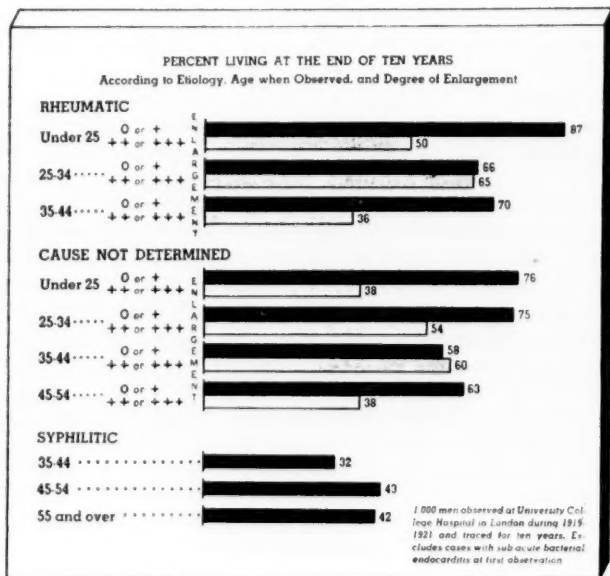
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PROGNOSIS IN HEART DISEASE



CHILDREN. An eight-year study of nearly 3,000 children with rheumatic fever showed that the great majority survived. The proportion of survivors exceeded 90% among those with no evident heart disease reported at first visit. Death rates were highest in the first year after the attack. Cases with heart involvement had consistently higher death rates.

YOUNG AND MIDDLE-AGED MEN. A ten-year survey of British war veterans pensioned for heart disease showed that the most favorable prognosis was in cases of rheumatic or undetermined etiology and little or no cardiac enlargement. At the younger ages, in some groups, more than 75% survived. When definite enlargement existed, fewer survived.



(after Grant)

Subacute Bacterial Endocarditis

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Prepared for Modern Medicine

DURING the past five years a revolutionary change has taken place in the treatment of subacute bacterial endocarditis. This by no means rare disease was previously almost uniformly fatal.

As a result of our recorded experience, and that of many others who followed, the fact now is clearly apparent that penicillin cures an unprecedented number of patients with subacute bacterial endocarditis. Our group has personally observed and treated 200 patients with this disease and the ensuing comments are based largely on this clinical material.

DIAGNOSIS

The classical manifestations include chills, fever, diaphoresis, emaciation, splenomegaly, various cardiac symptoms, renal disturbances, tender cutaneous lesions, petechiae, Osler nodes, purpura, pulmonary symptoms, sternal tenderness, café-au-lait expression, joint and ocular changes, and central nervous system embolic phenomena. However, the clinical diagnosis of subacute bacterial endocarditis is generally accepted when only the following manifestations are evident: a past history of rheumatic fever with resultant cardiovalvular defect or the pres-

ence of congenital heart disease; an insidious onset with lassitude, weakness, anorexia, and low-grade fever; cutaneous or visceral embolization and splenomegaly.

The diagnosis is authenticated when, in addition to the preceding manifestations, the blood culture is positive, the infecting organisms being preponderantly (90 to 95%) the non-hemolytic type of streptococcus. With persistence and proper technics, positive blood cultures can be obtained in about 85% of patients.

Ideally, the treatment program should be based on the identity and test-tube behavior of the infecting organism. However, in order to save valuable time, minimize the hazard of serious embolization, and obviate excessive damage to the cardiovalvular apparatus, it is inadvisable to await an unequivocal laboratory confirmation.

Measurements of penicillin blood levels and in vitro sensitivity values of infecting organisms yield valuable information in the establishment of treatment programs. For this reason institutions responsible for the welfare of subacute bacterial endocarditis patients must be equipped to do reliable penicillin assays on body

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fluids. The correlation between in vitro measurements and clinical results has been surprisingly good.

In general, organisms inhibited by less than 0.1 to 0.5 units of penicillin per milliliter of test broth are considered sensitive and, in a high proportion of patients, our routine therapy (daily dosages of 2 million units) has been successful in terminating infections due to these organisms. To accomplish cures with causative organisms inhibited by 0.5 to 10 units per milliliter relatively large daily dosages of penicillin (5 to 10 million units) are required. In the treatment of patients whose organisms require 10 to 25 units or even more per milliliter of test broth, we resort to heroic daily dosages (10 to 40 million units) of penicillin with and without enhancing agents such as Staticin (caronamide).

Staticin helps to conserve the consumption of penicillin when massive daily dosages are required. The economic implications are obvious. More important, some patients have difficulty in maintaining adequate blood levels despite intensive penicillin dosage. With the conjoint use of Staticin not only the theoretic blood values for a given intravenous dose of penicillin can be obtained, but multiples of these anticipated values can be achieved. This factor may mean the difference between success and failure in treatment of the patient with a refractory case of subacute bacterial endocarditis.

The discovery of streptomycin gave promise of adding an effective agent in the treatment of patients infected with the more resistant types of causative organisms, such as the enterococci. Some of these strains are relatively more sensitive to streptomycin than

to penicillin. Although in such cases it is comparatively much easier to achieve the necessary blood levels with streptomycin, the well-known toxic side-effects of this antibiotic would favor the use of penicillin, particularly for long-span therapy.

We have found it expedient to use both penicillin and streptomycin concurrently in some patients in order to terminate their infection.

THERAPY

Penicillin in adequate dosage for a long enough span remains the important factor for recovery in subacute bacterial endocarditis. Although cures have been reported with penicillin administered by all parenteral routes, we believe that, in this disease, a constant drip of proper concentration should be used routinely. Optimum inhibiting blood levels can thus be maintained fairly uniformly day and night. Treatment failures on fractional intramuscular administration have responded satisfactorily when given continuous venoclysis therapy.

Continuous intravenous drip is technically more difficult to administer than fractional or continuous intramuscular dosage. However, the employment of 23-gauge needles and utilization of veins about the wrist, forearm, and lower extremities circumvent many inherent disadvantages. The method is attended with minimum discomfort to the patient and is extremely well tolerated.

The incorporation of a modest amount of heparin (50 mg.) in the venoclysis is a valuable adjunct for continuous therapy, especially when massive daily dosages of penicillin up to 40 millions units are required. The customary diluent is Ringer's solu-

tion—1 liter daily to prevent overloading the circulation.

To obviate cerebral embolization from loosely attached vegetations, we inaugurate therapy with a short three- to five-day span of fractional intramuscular injections. This period is devoted to appraisal of the cardiovascular apparatus and the study of myocardial and renal function. It also enables us to elicit foci of infection and plan their removal.

DOSAGE AND DURATION

Most treatment failures have been owing to subcurative dosages of penicillin. In view of the serious nature of the disease and lack of toxicity of the drug, one should not hesitate to adopt optimum dosage. For routine treatment a conventional daily dosage of 2 million units is recommended. For the more resistant infecting organisms still larger amounts should be given, aiming to attain average blood levels at least five, and preferably ten times the *in vitro* values.

In a disease in which loss of time means progressive and irreversible valve damage, it seems wise to attempt the earliest possible termination of the infection. A cure must and can be obtained with the initial span of therapy. We generally advise, for the average case, an uninterrupted course of 2 million units of penicillin daily for five weeks. For relapses, treatment failures of all types, and infection with refractory organisms, larger dosages must be given and continued for at least eight weeks.

The satisfactorily treated patients improve promptly in all respects with rapid subsidence of all clinical and laboratory evidence of persisting infection. The erythrocyte sedimenta-

tion rate remains the most valuable and practical criterion of cure. Occasionally fever, elevation of the sedimentation rate, and embolization continue for several weeks after a successful course of therapy, despite sterilization of the blood stream and endocarditic lesions. We have observed typical Osler nodes and massive cerebral embolization in patients who proved to be free of active infection. These embolic phenomena were obviously sterile.

Persistence of positive blood cultures for more than a few days after inauguration of treatment is unequivocal evidence of inadequate dosage and calls for prompt drastic revision in the therapeutic program. Relapses usually become evident within two weeks of cessation of therapy. Since institution of our current optimum dosage schedules no such relapses have occurred.

The overall recovery rate in our consecutive unselected series of 200 cases of subacute bacterial endocarditis does not reflect the changing type of clinical material. A considerable number of our patients were not deteriorated, had no previous treatment, and had fairly sensitive causative organisms. In these patients, as judged by our experience, a recovery rate of at least 92% can be anticipated with adequate treatment programs.

The last 33 patients admitted were, for the most part, treatment failures in other institutions due mostly to subcurative dosage of antibiotics and refractory organisms. Penicillin had been used alone in most cases.

Daily dosages of 5 to 40 million units of penicillin were required with or without enhancing agents in treatment of these 33 patients. A total of

66 million to 4 billion units of penicillin was given, the average being 630 million. The penicillin was administered by continuous venoclysis for a span of at least eight weeks, made possible technically by the conjoint use of heparin. At times streptomycin was also included.

Of these 33 refractory patients, 6 remained unequivocal treatment failures despite massive dosages. The others, 81%, were considered cured by all clinical and laboratory criteria.

PROPHYLAXIS

Finally, reference may be made to the prophylactic measures which are an important part of our program. We early recognized the importance of foci of infection. Dental infections are particularly notorious as seeding foci for initial attacks and recurrences.

The prophylactic program is inaugurated as soon after admission as the patient's condition will permit. Eradication of infected foci is best accomplished early during the intensive therapy. Penicillin is administered intravenously and heparin withheld during the requisite procedures, which are well tolerated by these patients.

After therapy is completed the recovered patients are referred to our special follow-up clinic. It is comforting to see how well these patients do. Many return to gainful occupations and appear to improve with time. The

total posttherapy observation period has now exceeded five years. Some patients have succumbed as a result of their primary cardiac condition, a complicating coronary thrombosis, or intractable congestive heart failure predicated on mutilation of the heart valves.

At all times during and after active treatment, the patients are urged to be on a salt-poor, limited-fluid, high-vitamin, high-caloric diet. They are advised to take some multivitamin preparation daily and a hematinic if their hemoglobin is below par. They are told to have at least ten hours of bed rest each night and avoid excessive exercise, particularly stair-climbing, as much as possible. They are instructed to report promptly any excessive fatigue, loss of appetite, or rise in temperature.

Upper respiratory infections and dental procedures are particularly prone to induce reinfection. For this reason all our recovered patients have received either modest daily doses of sulfonamides or influenza A and B virus vaccine. Patients are protected with adequate doses of penicillin or other suitable antiinfective agents before and after such dental procedures as tooth extractions and drilling of deep cavities. Similar protection is afforded in the course of any operative procedure that may cause bacterial invasion of the blood stream.

Treatment of Circulatory Insufficiency

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Prepared for Modern Medicine

PREVENTION is the watchword in the modern treatment of circulatory disorders. With a knowledge of heart disease and of the disturbances leading to heart failure, the physician can select the rational therapeutic measures for the individual patient.¹

Concepts of the mechanism of circulatory failure have varied widely throughout the years, from "backward pressure" to "forward pressure," and combinations of the two theories. Recent vigorous attacks on the problem, using new methods of clinical physiology, have yielded evidence of the rationality of certain concepts. Divergent views may now be fused into a fairly clear picture of the fundamental functional changes involved.

Circulatory insufficiency diminishes the heart's ability to increase its output in response to strain, so that at certain levels cardiac output cannot satisfy body needs. Although the heart depends upon many factors for proper maintenance of blood flow, the state of the heart muscle is of primary importance.

RECENT INVESTIGATION

The wide use of Forssmann's² method for venous catheterization of the right heart and pulmonary artery, to-

gether with the oxygen, carbon dioxide, and pressure studies in man by Cournand and associates, McMichael and Sharpey-Schafer, and others,³ has given new understanding of the physiology of the circulation.

Stead and Warren⁴ found that the factors influencing cardiac output in patients with heart disease were atrial pressure, ventricular activity as controlled by vagus reflexes, peripheral resistance, tissue requirements in the total vascular bed, and a factor of nervous imbalance induced by sympathetic stimulation through emotional stress, epinephrine, or autonomic suppression under atropine. The venous filling pressure and the general arterial pressure are determining factors. Chronic anemia, valvular or congenital defects, hyperthyroidism, hypertension, nitrite poisoning, syncope, shock, disorders of the cardiac mechanism, and pericardial tension contribute to heart failure with either high or low cardiac output.

Starling's Law of the Heart⁵ has been reconfirmed. It is applicable in the explanation of circulatory (high output) and congestive (low output) failure. Starling and Visscher⁶ showed that oxygen consumption and de-

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mands also increase with muscle fiber length. If the oxygen supply is inadequate, the muscle fails in efficient control. Any limitation of the oxygen supply to the heart curtails myocardial efficiency.

Normally, the cardiac output rises in proportion to the demand and the increase in the ventricular volume in diastole. The curve of the basal relationships is very smooth and the summit is high in young, strong, well-oxygenated hearts. There is a maximal point of cardiac reserve above which further ventricular dilatation reduces cardiac output. In myocardial weakness the maximal point is low and the basal relationship of cardiac output to diastolic volume fails early.

Complex and partially effective compensatory mechanisms, such as vasoconstriction, venous engorgement, pressure rise, and increased blood volume, are called into play whenever the cardiac output drops. Circulatory changes in organs, especially in the kidneys, liver, lungs, and brain, promptly develop and congestion occurs. McMichael and Sharpey-Schafer noted that active venoconstriction may cause venous hypertension.

Clinical manifestations which are considered evidence of myocardial insufficiency certainly have their origin in the failure of heart muscle contraction sufficient to empty adequately the ventricular cavities. There is thus a gradual or sudden dropping of the heart's ability to increase, absolutely or relatively, the ventricular output in response to the demand. Merrill pointed out that, at certain critical levels of cardiac output, the blood flow falls below what is necessary for the normal renal function of sodium excretion and for an adequate supply

of oxygen to the tissues. The result is sodium and water retention in the extracellular compartment, venous congestion, and reflex constriction. This is the picture of congestive heart failure.

TYPES OF HEART FAILURE

Backward pressure congestive failure is essentially an absolute failure in cardiac output caused by a lowered gradient of blood flow through the systemic and pulmonary circulatory beds. The blood mass accumulates in the channels back of the heart. Venous return from the periphery to the heart is altered and venous pressure rises. Dilatation of the venous vascular beds slows the flow, but the total volume of the flow may be normal.

Symptoms and signs appear when the flow to the tissues becomes inadequate. Congestive failure of the left ventricle is generally considered associated with congestion and edema of the lungs. Swelling of the liver and edema of the dependent parts usually appear with right ventricular failure.⁷

In general, the ventricular minute volume output depends upon the major types of cardiac involvement. The cardiac output is absolutely decreased in myocarditis with myocardial insufficiency, and acute or chronic congestive or backward pressure failure results. This is seen in coronary atherosclerosis, with failure, rheumatic, infectious, or myxedematous myocarditis, diastolic hypertension, systolic hypertension with small pulse pressure and in high-grade tachycardia, cardiac tamponade, and pericardial constriction.

All of these conditions lead to relatively early decompensation and are promptly affected by supportive treat-

ment—digitalization, use of vasodilators, and such corrective measures as decompression.

Forward or circulatory failure is more often acute than chronic and may be present in acute extremely low cardiac output and chronic relatively low cardiac output. Shock, hemorrhage, and vasoconstriction promptly precipitate critically low cardiac output and necessitate immediate efforts to help restore the circulating blood mass.

Chronic circulatory or forward failure usually brings a relatively inadequate response, in spite of augmented cardiac output with a wide pulse pressure due to a low diastolic hypotension, and apparently rapid circulation, an overactive vascular system, and a decreased peripheral resistance.

Evidence of an increased cardiac output is demonstrable, particularly with large acquired arteriovenous fistulas, certain congenital vascular or cardiac defects, hyperthyroidism, aortic regurgitation of syphilitic or rheumatic origin, systolic hypertension, anemia, beriberi, and in toxic effects from overdoses of alcohol or nitroglycerin. In these patients, decompensation is late. Overload causes failure, which usually persists and is refractory to treatment. Of course, the extra load is hard to remove and, as a result, therapy is difficult.

Theoretically the effects of digitalis are antagonistic and aggravating because of the tendency to increase cardiac output. It is rare, however, that such reactions are observed from therapeutic doses. Digitalis usually helps to restore venous and arterial pressures, circulation time, and cardiac output and relieve visceral congestion and increase urinary flow.

SALT AND WATER METABOLISM

In recent years many symptoms associated with heart failure have been found to be closely associated with salt disturbance and water metabolism. Apparently the circulation in the kidneys is extremely sensitive to changes in the general circulation and renal blood flow is the first to be affected by the decreased supply.⁸ The kidneys promptly cause a shift in blood volume flow and in salt and water metabolism.

The urinary flow may be reduced to a fifth of normal yet contribute only to sodium retention. The secondary constriction of the efferent arteries may insure a normal glomerular filtration of sodium but not of sodium excretion, since tubular reabsorption of sodium is supernormal. Kidneys and tissues hold sodium tenaciously in congestive failure.

The reabsorption of sodium in the renal tubules may be greatly enhanced by the excess of antidiuretic hormone produced by the slow circulation in the pituitary. The retention of sodium has been held responsible for the increased blood volume and the venous pressure rise.

The study of salt and water metabolism by Burch and Reaser⁹ using the isotope Na^{22} revealed a sharp, ninety-fold retention of sodium in heart failure. In a cardiac patient, it took twelve weeks to eliminate 50% of the Na^{22} while in healthy persons the same amount was eliminated in twelve days. Mercurial diuretics increased the Na^{22} output seventy-five times, and the chloride output followed concomitantly. The sodium and the water in the extracellular compartment and plasma definitely showed a concordant rise and fall.

It has been reported by Calvin¹⁰ that the plasma protein content of the blood mass actually increases in hemodilution and that in hydremia blood serum, proteins, and albumin are added from the tissues. Some patients with congestive heart failure and edema have absolute as well as relative oligoalbuminemia, probably as a result of liver damage. The low albumin contributes to the edema.¹¹

THERAPEUTIC MEASURES

Treatment of a patient with heart failure calls for prompt relief of the most disturbing or ominous symptoms. Steps should be taken to remove the precipitating factors, alleviate the perpetuating factors, and alter the predisposing factors in so far as possible.

Rest, diet, digitalis, and diuretics are the accepted measures. Sometimes one is adopted first, sometimes another; a combination may be necessary. In urgent situations all methods are applied as soon as possible.

Rest—Recumbency allows blood and edema fluid to flow into the chest and waterlog the lungs, but rest in the position most comfortable to the patient relieves some of the demands upon the circulation. Oxygen, by mask, relieves the physical strain of dyspnea. Morphine, judiciously used, is a great boon because it allays anxiety, relaxes spasm, and reduces the exhausting efforts of dyspnea. Addiction, however, is easily induced.

Diet—Low-sodium and acid-ash diets, such as Karell's daily ration of 6 glasses of milk with toast, help to start diuresis. Newburgh, Schroeder, and Schemm¹² have worked out elaborate low-sodium neutral or acid-ash regimes with ad lib. fluid intake. Schemm forces fluids by mouth and

gives 5% glucose slowly by vein in amounts up to 4 liters a day. Dilute hydrochloric acid or acid salts such as ammonium chloride are helpful.

Fluids—When treating heart trouble, enough water must be administered to satisfy normal cellular needs, especially if the patient is dehydrated. The amounts are increased in case of fever or if the patient's kidneys have low concentrating ability.

However, forcing fluids by intravenous 5% glucose is not without danger to a patient with congestive heart disease. Several instances of acute left ventricular heart failure have been observed by the author after intravenous injection of 5% glucose solution in large amounts. Very slow drip is preferable. The retained sodium controls the volume of retained fluid.

Sodium storage may be reduced by sharp curtailment of intake and a judicious use of the mercurial diuretics rather than by forcing of fluids primarily. It is often practical to reduce the sodium chloride content regularly with mercurial diuretics.

Digitalis—Some modern experimentalists have concluded that digitalization is unnecessary since edema can be eliminated with diuretics. Others feel that strict adherence to a low-sodium regime is all that is required to prevent edema.

However, digitalis therapy warrants consideration. The drug increases myocardial efficiency and slows the ventricular rate in atrial fibrillation. The cardiac systole is shortened and diastole lengthened within four hours of administration by mouth. Venous return and atrial pressure are decreased in heart failure with subsequent venodilatation on treatment.

McMichael and Sharpey-Schafer

have suggested the possibility that venoconstriction is present, but this has not been established. Increase or decrease in cardiac output upon therapy depends on whether the cardiac output was low or high before digitalization. McMichael and Sharpey-Schafer maintain that if the heart is being filled at pressure above the optimal, the drug may increase rather than diminish the cardiac output. In patients with high cardiac output, symptoms are conspicuous before myocardial insufficiency has reached the point at which further rise in venous pressure reduces cardiac output.

In patients with congestive heart failure resulting from acute rheumatic myocarditis, coronary artery, or hypertensive heart disease with tachycardia, and in disorders of mechanism with decreased cardiac output, symptoms promptly improve with digitalization. In mitral stenosis and myocardial infarction, symptoms usually have been precipitated early when the myocardium apparently had considerable reserve and response is gratifying.

With increased cardiac output, occurring with circulatory failure due to hyperthyroidism, syphilitic free aortic regurgitation, arteriovenous fistula, anemia, or beriberi, symptoms are usually not conspicuous until conditions are far advanced. When decompensation does appear it persists even after the myocardial insufficiency is rigorously treated. In such cases the need for minute volume flow for the whole body or a large area produces a reduction in venous filling which cannot be compensated, and shock may set in. The brain and heart, robbed by the increased flow diversion, may be irrevocably damaged.

Emergency therapy—In acute left

ventricular failure with pulmonary edema, emergency treatment is necessary. As in drowning, death may result from anoxia. Oxygen under 4 to 6 cm. of water pressure should be administered until the cyanosis clears. Morphine sulfate injections of 11 mg. (1/6 gr.) and 1 mg. (1/65 gr.) of atropine are given. Cardiac tonics such as 0.25 mg. of ouabain or 0.5 to 1.0 mg. of digitoxin may be given intravenously if it is certain that the patient has had no digitalis within two weeks.

In persisting pulmonary edema a hypertonic infusion may be given of 50 cc. of 50% glucose to which has been added 0.5 gm. of aminophylline and 0.5 gm. of ascorbic acid, with 40 mg. of Thiomerin subcutaneously.

The physician may resort to coronary vasodilators to improve myocardial function and to diuretics to remove edema and improve circulatory efficiency. It is desirable to maintain or reestablish sinoatrial rhythm if disorders of mechanism persist. In refractory cases of atrial fibrillation and failure one is justified in trying to restore the mechanism with quinidine.

Edema may persist in spite of rest, diet, and digitalis. Myocardial function may not be improved satisfactorily by such coronary vasodilators as niacin and papaverine and the old favorite oral diuretics—theobromine, theophylline, and aminophylline. Mercurial diuretics combined with the theophyllines have superseded these.

Diuretics—Urinary flow and sodium output are tremendously increased by diuretics. Edema is promptly dissipated and the patient's breathing becomes easier and he feels stronger.

Burch and Reaser have demonstrated that sodium output in the urine is increased seventy-five times as a result

COMPARISON OF THIOMERIN AND MERCUHYDRIN DIURESES

Drug	No. Cases	Total Urine (cc.)	Average Increases (%)
Mercuhydrin (I.V.)	50	2162	264+
Thiomerin (I.V.)	49	2950	305+
Thiomerin (S.C.)	38	3483	261+
	97	2011	

of mercurial xanthine diuretics. These drugs are now generally accepted as the best preparations for mobilization of sodium and for the patient with intractable edema.

Mercupurin, Mercuzanthin, or Sal-yrgran with theophylline has been widely used. Occasional evidence of toxicity was noted. Other combinations of mercurials were introduced and, very rarely, fatalities were reported immediately after intravenous introduction of mercurial diuretics; at least 2 instances of ventricular fibrillation have been recorded.

Mercuhydrin, a ureasuccinyl, organic mercurial theophylline combination, has been found to be a potent diuretic which is well tolerated intramuscularly and causes little, if any, pain. The emphasis, in recent years, however, has shifted from potency to the toxicity factors in mercurial diuretics.

Lehman¹³ combined MT6 with sodium thioglycollate and found that the sulfur profoundly decreased the toxicity and irritating effects of the mercurial. The combination is theoretically an ideal and safe mercurial and much better tolerated than the older diuretics. It contains 40 mg. of mercury per cubic centimeter.

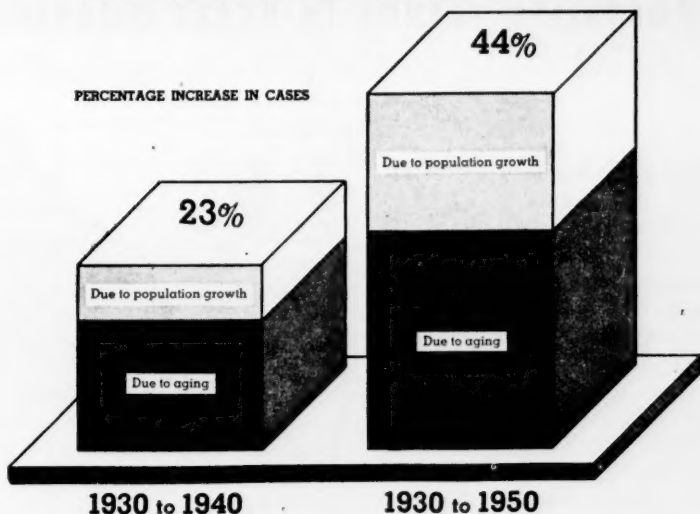
Lehman found that Thiomerin is one-hundred and sixty times less toxic than mercuhydrin. It can be injected subcutaneously without producing any significant pain or irritation. This drug marks a definite forward step in

the development of organic mercurials. Before giving the 2-cc. dose of Thiomerin, it is well to test for hypersensitivity by injecting 0.25 cc. to 0.5 cc. of Thiomerin subcutaneously. We have observed that there is a minimum of reaction to Thiomerin and have produced adequate diuresis with the drug subcutaneously (see table).

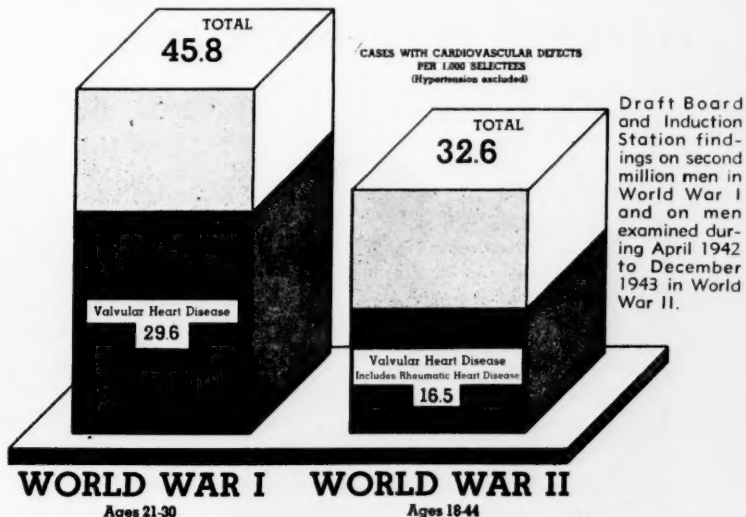
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PREVALENCE OF HEART DISEASE



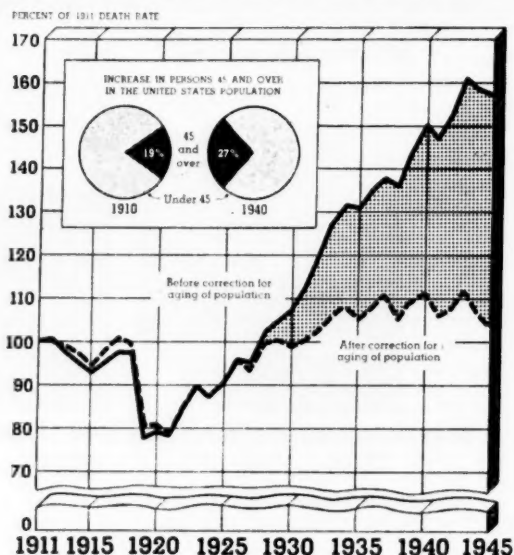
GENERAL TREND. About 4,000,000 persons in the United States are estimated to have heart disease. The number of cases has been growing principally because of: (1) Aging of the population; (2) Increase in total population.



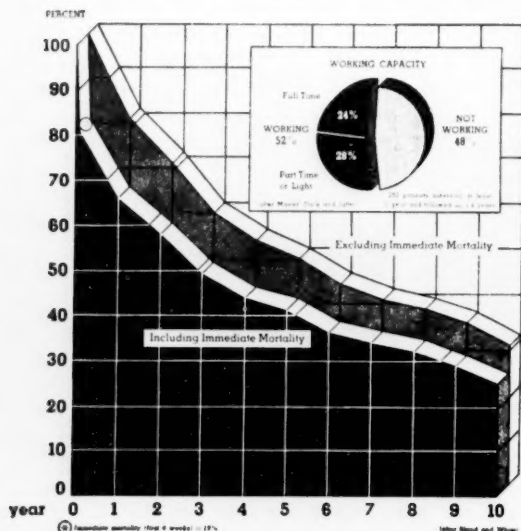
TREND IN YOUNG PEOPLE. At the younger ages a sharp reduction in the prevalence rate, particularly for rheumatic heart disease, is indicated by Selective Service statistics for World Wars I and II.

MORTALITY TRENDS IN HEART DISEASE

Deaths ascribed to heart disease have increased, but much of the increase in the rate is accounted for by the aging of the population.



PROGNOSIS IN CORONARY THROMBOSIS



The great majority of patients survive the initial attack of coronary thrombosis and live for many years. A considerable proportion of them are even able to resume normal or near-normal activities.

Management of Coronary Artery Disease

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Prepared for Modern Medicine

ATHEROSCLEROTIC occlusive disease of the coronary arteries is the major cause of death in this country in middle and old age. Whether this should be considered a disease or a more or less "normal" way of dying on a genetic basis, that is, an unalterable condition, is not established. So far, preventive procedures are but dimly imagined and often impracticable. Therefore, we are concerned with the treatment of individuals presenting symptoms or signs of relative myocardial ischemia, or, as some assert, excessive activity of vasodilator pain fibers passing to the coronary vessels.

In any event, the circulatory disturbances of heart muscle dependent upon coronary narrowing and occlusion show themselves in several syndromes which may be clinical, electrocardiographic, or both. These are angina pectoris, myocardial infarction of microscopic or macroscopic degree (including coronary insufficiency), congestive heart failure, and defects in rhythm and conduction of the heart. In the latter category may be placed auricular fibrillation and flutter, heart block of all degrees (including sinoauricular and auriculo-ventricular), the carotid sinus syndrome, ventricular tachycardia, low voltage, and intraventricular block.

However, none of these rhythms or conduction disturbances is found exclusively in association with coronary artery disease, and, indeed, many may occur as functional disturbances in otherwise apparently normal hearts. For that reason electrocardiographic abnormalities should be evaluated in relation to clinical evidence of cardiac disease, and care should be taken to avoid the intangible diagnosis of coronary sclerosis on insufficient evidence.

DIAGNOSIS

In this discussion of advances in diagnosis and treatment it must be emphasized that the main reliance for the recognition of coronary artery disease should be placed in careful history-taking and electrocardiography. The first has always been the foundation of satisfactory medical practice; the latter changes its concepts and technics with the development of electrophysiology, as, for example, by the study of unipolar and multiple precordial leads. However, all the possibilities of the x-ray department and the laboratory may be necessary in the differential diagnosis of the anginal syndrome.¹ Even with these resources available, the diagnosis may, in a few instances, be reduced to a matter of

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personal opinion. Of considerable interest are pains in the chest related to disturbances in rib articulations, muscle attachments, brachial plexus irritation, radiculitis, and disorders of the gastrointestinal tract.

Harrison² has recently emphasized useful points in the definition of angina pectoris: The pain was felt subternally in only about one-half the patients in his series. Pain entirely limited to periapical, axillary, or abdominal regions did not occur. The pain was never of a few seconds' duration, usually lasted a few minutes, rarely longer than half an hour. Pain of great intensity was the exception, being mild or minimal in more than half the patients. It was constrictive or heavy in only about 50%, was frequently aching and occasionally burning, and was lancinating in only 1 of 77 patients. In addition to the classical excitants—exertion, emotion, eating, and cold—the recumbent position and glucose deficiency were common precipitants.

Pain induced by sitting or standing or aggravated by breathing, coughing, or swallowing can usually be ascribed to disorders other than angina pectoris. Anginal subjects often have complicating chest pains from other pathologic conditions, and the two types of pain must be differentiated. Angina pectoris in 10% of the patients in Harrison's series, particularly in those living sedentary lives, was never related to effort. As has been noted by many observers, angina pectoris is rare in women under the age of fifty.

As far as acute coronary occlusion is concerned, the conditions to be considered in differential diagnosis were catalogued by Herrick³ in 1935. In my own recent experience pulmonary in-

farcion, dissecting aortic aneurysm, ectopic cardiac rhythms, and cerebrovascular syncope have been the most common. The fall in blood pressure accompanying all these may raise the suspicion of myocardial infarction.

The development of congestive heart failure in an individual over sixty, without a history or clear evidence of previous myocardial infarct, valvular deformities, or hypertension, always makes coronary disease a quite possible cause. Slowly developing multiple occlusions with "silent" infarcts are often the pathologic background. Auricular fibrillation is also common. In the early stages, characterized by breathlessness on exertion, the possibility of primary pulmonary disease—emphysema, chronic bronchopulmonary infection, and fibrosis—must be kept in mind. A diagnostic trial of digitalis may help to differentiate the cardiac and pulmonary elements.

If the patient is seen late in congestive failure, often with auricular fibrillation, in which the dyspnea, pulmonary râles, cough, and pulmonary hypertension may alter the auscultatory signs, the conditions commonly overlooked are calcific aortic stenosis, mitral stenosis, cor pulmonale, and thyrotoxicosis. Greater attention to the intensity of the heart sounds may prevent some of these errors. The diminished aortic second sound of aortic stenosis must be recognized, and the sharp character of the first heart sound persisting in a severely failing heart gives a clue to mitral stenosis.

The fashion of diagnosing coronary disease in great numbers of old people dying of obscure ailments should be counteracted by attempts at more accurate appraisal. Mueller-Deham⁴ has

shown by autopsy studies that old people usually die of a multiplicity of diseases, and infections, especially of the urinary tract, emphysema, bronchiectasis, pleural effusions, tuberculosis, and neoplastic disease are commonly missed clinically.

TREATMENT

The general management of patients with narrowing and occlusion of the coronary arteries consists of attempts to improve anoxia of heart muscle. Except in acute anginal pain treated by nitroglycerin, alcohol, and perhaps oxygen therapy, there seems to be little evidence that other measures, such as drug therapy with xanthines, papaverine, atropine, or vitamin E, are of value. The transference to clinical medicine of conclusions concerning the action of these drugs based on animal experiments appears largely unjustified.

With increasing angina pectoris of effort which is becoming angina decubitus, a major coronary occlusion is a probability at any moment. Rest and the passage of time, however, often tide the patient over into a better balance of coronary blood supply. There is the possibility that anticoagulant therapy at this stage may prevent propagating thrombosis. We have been impressed with the apparent effectiveness of the rice diet in a few instances of intractable angina decubitus. These measures have largely superseded paravertebral alcohol injection, sympathectomy, and rhizotomy in our therapy in recent years.

Except for the use of dicumarol there has been no great improvement in the treatment of acute myocardial infarction. Although present statistics indicate a decrease in thromboembolic

complications through the use of anticoagulants, there are practical limitations to their universal employment. The procedure requires hospitalization, careful laboratory supervision, and attention to the possibilities of hemorrhage. Fortunately, many mild attacks of myocardial infarction can be cared for at home and do not require anticoagulant therapy. Recently reported favorable experiences with vitamin K in acute coronary closure are as yet unsupported by convincing observations.

Congestive failure as a result of coronary artery disease is not characteristic. Hypertension often is the added factor in cardiac strain. Digitalis, diuretics, and rest are effective, but the major recent advance in therapy is the rigid low-sodium diet, which is far more successful in preventing fluid retention than is the customary low-salt diet.

Cardiac arrhythmias of importance in coronary disease are auricular fibrillation and flutter, heart block, carotid sinus syncope, and ventricular tachycardia. For the first two, digitalis is the drug of choice to reduce the apex rate to a normal level of 70 to 80. The newer purified products, such as digitoxin, have certain advantages in speed of action and, perhaps, in standardization of dose, but for routine use, particularly of the ambulatory patient, the whole leaf is preferable.

The attempt at restoration of normal rhythm by quinidine is rarely, if ever, justified in fibrillation or flutter due to severe organic changes in the myocardium of advanced coronary disease. However, we have found it advisable to give quinidine sulfate, 0.2 gm. (3 gr.) every four hours during the first two weeks of acute coronary occlu-

sion to prevent ectopic rhythms, particularly ventricular fibrillation.

Heart block with Adams-Stokes syncope is best treated with epinephrine, which may be given, 0.25 to 0.5 cc. of 1:1,000 aqueous solution, hourly subcutaneously until the attacks of standstill subside, then at increasing intervals up to once every four to six hours. Ephedrine and barium chloride by mouth are less effective, although ephedrine has been given with success in doses up to 50 mg. ($\frac{3}{4}$ gr.) in enteric-coated capsules every two hours. In a few cases of block occurring with basal myocardial infarct, nitroglycerin appears to have been successful in restoring normal conduction.

Sensitivity of the carotid sinus usually increases to some degree with age, but extreme irritability of the reflex has been considered evidence of coronary pathology. The use of phenobarbital in small doses and the avoidance of tight collars may be effective in preventing syncopal attacks. In some instances denervation of the sinus is necessary.

Ventricular tachycardia is a very serious rhythm in coronary disease. It is usually seen in the acute stages of myocardial infarction and necrosis. Quinine has been used intravenously, and quinidine lactate is available for intramuscular administration or by slow intravenous drip. These drugs may be effective and are, of course, less dangerous by mouth. Recent work indicates that a useful medication, less hazardous than intravenous quinidine,

is intravenous morphine, 0.01 to 0.04 gm. ($\frac{1}{16}$ to $\frac{2}{3}$ gr.), at intervals of thirty minutes to two hours.

PREVENTION

From a long-range point of view the prevention of coronary atherosclerosis seems to be in the domain of genetics, but many investigations are now under way to determine, if possible, the variables susceptible to alteration in the complex equation of cholesterol deposition in arteries. One obvious problem calling for solution is the preponderance of coronary disease, at least under the age of fifty, in the male sex.

At the moment, preventive measures of possible value are avoidance of overweight, of severe and unusual physical effort in untrained individuals, and of any prolonged physical or nervous fatigue in middle-aged men.

Of value also may be a low cholesterol diet for members of families in whom hypercholesteremia is demonstrated, small doses of thyroid when high blood cholesterol and low basal metabolic rate are found, decholesterolizing agents⁵ (choline, methionine, inositol, alcaucil, berenjena, potassium iodide), soya lecithin, and pancreatic extracts.

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Pathogenesis and Treatment of Hypertension

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EXTENSIVE experimental studies during recent years have advanced our knowledge of the etiology of hypertension and have given a better understanding of the basic pathologic physiology underlying this common disorder. It is no longer justifiable to attribute essential hypertension, as was done for so long, to the inevitable consequences of the aging process, for it has been well established that experimental hypertension, which can readily be induced in laboratory animals, is of renal and humoral origin.

The statement is frequently made that clinical hypertension as it occurs in man and experimental hypertension as induced in the rat or dog represent different diseases and are not comparable, but there is no basis for this skepticism. As a matter of fact, all extant data support the view that experimental and clinical hypertension are fundamentally identical and that further experimental studies will not only elucidate the nature of the disorder as it occurs in man but may also lead to the discovery of methods for its management.

The classic experiments of Goldblatt and his collaborators demonstrated that interference with the blood supply to the kidney results in an elevation in the systolic and dias-

tolic blood pressure of the dog without materially influencing the excretory function of the kidney. These experiments, which have been amply confirmed and extended, indicate that the kidney is involved in the pathogenesis of hypertension and that the excretory function of this organ may be dissociated from its function in maintaining a normal blood pressure level. It has furthermore been demonstrated that this renal hypertension is not neural in origin, since interruption of the nerve supply to the kidney fails to abolish it, but is humoral and mediated through the kidney.

It has been generally assumed that the nervous system may participate in the causation of clinical hypertension, but this view is based on no objective evidence. The rise in blood pressure which follows an increase in intracranial pressure, during severe exercise, or following excitement is a physiologic response and one cannot assume that similar stresses give rise to permanent hypertension. The hypertension that follows section of the carotid sinus and aortic depressor nerves or the induction of cerebral ischemia by constriction of the cerebral vessels differs in fundamental respects from experimental renal hyper-

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tension. The claim that the stresses of modern life are responsible for the development of hypertension is based on no convincing evidence nor does it find support in recent experimental studies.

The demonstration that experimental hypertension was humoral in origin led to the view that renin, a constituent of renal extracts discovered by Tigerstedt and Bergman in 1898, was liberated from the ischemic kidney and induced the rise in blood pressure observed in hypertension. Subsequent work cast doubt on the role played by ischemia and indicated that renin acted on a serum globulin (hypertensinogen) to give a polypeptide (hypertensin, angiotonin) which was pressor in action. However, recent studies have demonstrated the invalidity of this renin-hypertensin theory as an explanation of the humoral mechanism concerned in hypertension.

Some of the fundamental objections to the renin theory are the demonstrations that [1] adequate amounts of renin are not demonstrable in the blood of hypertensive patients and animals, [2] removal of an ischemic kidney does not abolish preexistent hypertension, [3] renin is effective following pithing, whereas hypertension is abolished by this procedure, [4] hypertension occurs in the nephrectomized member of a pair of parabions, [5] the *in vivo* renin effect as shown by Mylon, Lund, and Heller is not adequately explained by hypertensin formation, and [6] as recently shown by Vanatta, Muirhead, and the author, hypertension is induced by bilateral nephrectomy. The view that hypertension is due to the liberation of a pressor agent is thus untenable

and the available evidence points rather to the kidney as manifesting an incretory function which, if in abeyance, results in the clinical disorder designated as "hypertension."

A knowledge of the pathogenesis of hypertension allows a critical evaluation of the rationale of the available therapeutic procedures. In no other field of therapy are results of treatment more difficult to assess, since not only is hypertension in most instances accompanied by few or no symptoms, but the course of the disease is extremely variable. The long period of observation under the most carefully controlled conditions necessary for evaluating a form of therapy renders clinical studies in this field extremely difficult. Many of the forms of therapy advocated in the past have been shown ultimately to be entirely irrelevant.

The therapeutic measures used in recent years in the treatment of hypertension may be classified as [1] general measures, [2] hypotensive drugs, [3] unilateral nephrectomy and correction of surgically remediable aberrations of the urinary tract, [4] dietary measures, [5] sympathectomy, and [6] substitution therapy.

Among the *general measures* used in treating the hypertensive patient are frequent periods of rest, the cultivation of moderation in both physical and mental activities, avoidance of obesity, and the judicious use of sedatives. All these, by contributing to the general serenity of the patient, will obviously help in averting strain from the circulatory system, but to what extent they can delay the inexorable effects of the disease is problematic.

In any case, they should be used judiciously and without imposing on

the patient such restrictions as will serve only to increase his anxiety. Although claims have been made for the effectiveness of psychoanalysis and psychiatric treatment in some patients, these therapies remain open to question as long as the role of nervous disorders in the pathogenesis of the disease is unproved.

The use of *hypotensive drugs*, such as the nitrites or thiocyanates, has long been advocated but their effectiveness is questionable and their use irrational. In carefully controlled experimental studies these substances, in moderate doses, fail to reduce the blood pressure, since their vasodilatory action is compensated for by an increased cardiac output. When sufficiently large doses of such drugs or more potent agents are used, the drop in blood pressure is accompanied by symptoms so undesirable as to preclude their use. Thiocyanate may exert a sedative effect, but in view of its potential toxicity, safer sedatives when needed are to be preferred.

Following the promulgation of the view that hypertension results from the liberation of a pressor agent by the diseased kidney, *unilateral nephrectomy* was performed in order to remove the source of this pressor agent. As already stated, this hypothesis is no longer tenable and all agree that nephrectomy should be performed only when indicated for surgical reasons and not with any hope of affecting the blood pressure except, perhaps, in rare instances.

Obviously, the *correction of surgically remediable lesions of the urinary tract* may better renal function and thus ameliorate, or at least prevent further damage to the kidney and thereby help control the resulting

hypertension. Unfortunately, only a small percentage of hypertensives have such remediable lesions.

The *dietary measures* advocated in the management of hypertension consist of the rice diet and drastic restriction of sodium. In the author's opinion, the value of the rice diet depends solely on the fact that it is low in sodium content. Hence, equally effective results can be obtained without subjecting the patient to the rigors of a monotonous diet.

F. M. Allen, who has advocated and used the low-salt diet for over a quarter of a century, believes that it "specifically arrests the progressiveness of hypertension" and furnishes "a rational therapeutic solution of the enormous hypertension problem." Others feel that it is simply a symptomatic method of therapy which, however, should always be given a trial before subjecting the patient to such drastic procedures as sympathectomy.

Sympathectomy has been used with increasing frequency and claims of success in recent years. That this measure has value in some patients is widely accepted, but the number of patients who may be expected to profit from the operation is a matter of controversy. Fishberg, in a recent critical study based on observations of 119 patients, concluded that although the procedure is palliative and not curative, it is helpful and even life-saving to some patients but that it is indicated in less than 4% of patients with essential hypertension.

Substitution therapy in the form of renal extracts and oxidized marine oils is still in an experimental stage of development and hence need only be mentioned here.

Roentgen Diagnosis of Heart Disease

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To determine the position, size, and shape of the heart, roentgenograms give the most accurate information of any method known today. Their value lies less in the detection of cardiac disease than in the study of the diseased heart. Roentgenograms aid in the differential diagnosis of the abnormality and may help to evaluate the physiologic state of the heart—prime factors in prognosis and therapy of the cardiac patient.

If heart disease is known or suspected, the initial step in roentgen examination is careful fluoroscopy. The observer should conscientiously study and record the appearance of the vascular structures. In doing so, a routine sequence of observation is of great help to the beginning examiner. The things specifically to be looked for, and which the examiner must train himself to recognize, are: [1] position, size, and shape of the heart, [2] character of cardiac movement, [3] calcification within the heart shadow, and [4] extracardiac changes which may prove relevant.

HEART POSITION AND SIZE

The position of the heart is more accurately determined by fluoroscopy

or radiography than by any other method. Alterations in position do not as a rule indicate heart disease but are usually the result of pulmonary or other extracardiac changes.

In determining heart size, two things should be kept in mind: [1] Radiologic measurement of the heart yields an *index* of heart size, not true measurement. It is this index which is correlated with clinical abnormality of the heart. [2] The reliability of the measurement, and therefore the deduction, depends upon uniformity in technic.

The simplest and most generally useful index of heart size is the measurement of the transverse diameter of the heart on a teleoroentgenogram. The latter is a posteroanterior projection of the chest taken at a 7-ft. tube-film distance on an average inspiration. The transverse cardiac diameter is the sum of the measured horizontal distance from the midline to the maximum right and maximum left borders of the heart.

In the normal heart the maximum left border is 2 or 3 cm. below the maximum right border. Together with the height and weight of the patient this observation can be compared with established average values.¹ If the

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heart varies as much as 10% from the predicted average it is probably abnormal; if it varies 15% or more it is almost certainly abnormal.

In making the teleoroentgenogram the target-film distance should remain constant, the patient should be well centered upon the film, without rotation, and the exposure of the film should be sufficient to penetrate the heart borders to a soft gray to permit accurate measurement and differentiation from pericardial fat. Finally, the exposure should be made on a normal, not deep, inspiration. Breath-holding may introduce an error up to 2.5 cm. in the transverse diameter measurement.

Other methods of determining heart size may be used, such as orthodiagraphy or area or volume calculations.

As do most attempts at forcing biologic data to conform to rigid criteria, the use of cardiac measurement alone in survey or in sorting the abnormal from the normal sized heart falls short of 100% correlation. How then may the radiologist make optimum use of changes in heart size in the diagnosis of heart disease? By fluoroscopic all cases with abnormal or nearly abnormal measurements and all recognized or suspected heart cases.

Four distinctive cardiac silhouettes may be recognized in the postero-anterior projections:

HEART SHAPE

1 The *mitral* silhouette is pear-shaped with a straight or slightly rounded prominence in the middle third of the left heart contour due to fullness of the tip of the left auricle. The right border is usually more prominent than normal, as is the pulmonary artery, a configuration found

in mitral stenosis and patent ductus arteriosus. Hyperthyroidism may produce a similar shape. Funnel-breast deformity of the chest, which often suggests heart enlargement on the teleoroentgenogram, may simulate the mitral shape, but lack of enlargement in the oblique projections will rule it out.

The dilated left auricle can be identified in either the left or right anterior oblique view; in the former just below the left bronchus, in the latter projecting from the middle third of the posterior border of the heart shadow. In moderate enlargement of the left auricle a barium swallow will reveal the esophagus displaced posteriorly in a smooth concavity just below the level of the hilum of the lung. This is best seen in the right anterior oblique position.

2 The *aortic* shape results from a prominent enlargement of the left ventricle and is found primarily in aortic valvular disease and hypertension. Other conditions associated with either left ventricular hypertrophy or dilation and giving an aortic shape are coronary insufficiency, coarctation of the aorta, ventricular septal defect, arteriovenous aneurysm, and tetralogy of Fallot.

The aortic shape is characterized in the posteroanterior projection by a cardiac silhouette with a full, rounded lower left border, the so-called "wooden shoe" appearance. Right ventricular enlargement may simulate left ventricular enlargement. The enlarging right ventricle may push the left ventricle laterally, upward and posteriorly. This can usually be recognized by noting that the actual apex of the heart is lifted well above the

left diaphragm. This commonly occurs in cor pulmonale and tetralogy of Fallot. In addition, the tetralogy usually has a silhouette with a narrow "waist" of the heart, or a concavity of the left border due to a small pulmonary artery; at fluoroscopy pulsation of the hilar vessels is absent.

3 The *combined* configuration results from enlargement of all chambers and, as a rule, the heart is much larger than with mitral disease alone. In effect the shape is the aortic superimposed upon the mitral silhouette. The results are four rounded convexities of the left border which, from above downward, are made up of the aortic arch, the enlarged pulmonary artery, the tip of the left auricle, and the left ventricle. The combined configuration is found in combined mitral and aortic valvular disease of rheumatic origin, but may be simulated by auricular septal defect or Eisenmenger's complex.

4 The *pericardial* shape is found primarily in pericardial effusions but is commonly simulated by a dilated heart in advanced generalized myocardial failure, by myxedema, and by beriberi heart disease. The heart takes on a "water bottle" shape. It is enlarged both to right and left and loses the normal convexities.

CARDIAC MOVEMENT

Study of cardiac movement should include rate, rhythm, and amplitude of movement along the borders of the visualized chambers.

Observation of change of rate with respiration or on holding the breath permits a simple but accurate determination of the presence or absence

of normal sinus arrhythmia. The ventricular rhythm may be either regular or irregular. True irregularity is most commonly due to extrasystoles or auricular fibrillation. Apparent irregularity is due to diaphragmatic motion and can be excluded by having the patient hold his breath.

The amplitude of cardiac pulsation along the visualized heart border may be increased, decreased, absent, or paradoxical. In the anteroposterior projection the normal range of amplitude of contraction is 4 or 5 mm. on the left border by the left ventricle and 2 mm. on the right border by the right auricle. Maximum cardiac pulsation should be seen at the apex of the heart in the left anterior oblique position with the patient rotated sufficiently so that the cardiac apex clears the spine. In this position it may vary from 5 to 10 mm. partly because of rocking of the heart.

The aorta will normally pulsate about 2 mm. between systole and diastole, best seen just above the right auricle on the right and the level of the aortic knob on the left. The hilar vessels normally may have a barely perceptible pulsation, while the left hilum almost always shows a definite rocking motion en masse which is the transmitted pulsation from the heart.

Generalized increase in amplitude occurs in anemias of 50% hemoglobin or less, hyperthyroidism, neurocirculatory asthenia, auriculoventricular fistulas, patent ductus arteriosus, aortic insufficiency, and other conditions. In patent ductus arteriosus the increase involves the left ventricle, pulmonary artery, and aorta. It may be most striking in the pulmonary artery.

Diminished amplitude of pulsation is due either to masking of the con-

traction by pericardial fluid, by diminution of contractility due to myocardial failure, or to hypertrophy of the myocardium as in most hypertensive hearts and some cases of coronary insufficiency. The thicker the left ventricular wall, the less apparent is the contraction of the myocardium peripherally when the chamber empties its contents. Thus an apparent sluggish contraction of the heart along the left ventricular border does not necessarily indicate that the heart is failing.

The clue lies in comparison of the pulsation of the heart with that of the aorta during fluoroscopy. If the aorta shows normal or even increased pulsation with diminished left ventricular amplitude, one may assume myocardial thickening or hypertrophy. If the aortic pulsation is simultaneously diminished the poor heart beat is probably due to myocardial weakness.

Actual myocardial infarcts are not demonstrable by fluoroscopy. On rare occasions in massive infarction a paradoxical pulsation may be recognized in which a portion of the myocardium expands or bulges during systole owing to the local lack or loss of contractility.

CALCIFICATION

Calcification within the heart is not rare. For recognition, a small-focus fluoroscopic tube and fine screen such as Patterson Type B are necessary. The examiner's eyes must be completely dark-adapted and the heart area examined while the patient holds his breath, with the x-ray beam coned down to a diameter not exceeding 5 to 6 cm. Calcification may be of five types:

1 Myocardial calcification is rarely seen during life. When present it is almost invariably due to calcification in an old myocardial infarct and occurs predominantly in the posterior heart wall.

2 Pericardial calcification occurs most commonly along the diaphragmatic surface of the heart and anteriorly over the right ventricle. It may, however, be of any degree and involve any area. The curved plaques over the periphery of the heart indicate adhesive pericarditis but do not necessarily indicate the clinical condition of constrictive pericarditis.² Half the cases of constrictive pericarditis do not have calcification demonstrable by fluoroscopy.

3 Calcified coronary arteries are recognized as short parallel segments of calcium deposits, which may be localized with considerable accuracy.³ Their presence merely confirms coronary arteriosclerosis and bears no known definite clinical correlation with coronary occlusion, infarction, or angina pectoris.

4 The identification of cardiac valvular heart calcification definitely establishes the diagnosis of valvular heart disease, almost invariably rheumatic. Valvular calcification usually comprises punctate or conglomerate nodules of calcification which may be recognized deep in the heart by a rapid dancing "to and fro" or triangular motion during systole and diastole. Localization in the mitral or aortic valves is best done in the oblique positions.⁴ True valvular calcification must be distinguished from calcified annulus fibrosus of the mi-

tral valve, which also lies in the mitral area and presents a gentle wave-like motion in systole and diastole.

5 Calcified mitral annulus, however, is usually larger and denser than valvular calcification and is shaped like a segment of a circle or ellipse. It is presumably a senile change of no clinical significance except that it is frequently associated with a systolic murmur. It bears no relation to antecedent rheumatic fever.

EXTRACARDIAC CHANGES

Extracardiac changes may be extremely helpful in revealing the type, physiologic state, and sometimes the duration of the cardiac abnormality. The mildest degree of passive congestion gives the picture of simple vascular engorgement. The pulmonary vessels will be larger, increased in caliber, with resulting increased prominence of hilar shadows.

In addition to enlarged vascular shadows further degree of failure shows haziness and irregular margins of the markings as transudative fluid seeps into the supporting tissue around the vessels. As this increases, transudative fluid will replace air in the alveoli, and the pulmonary vascular markings on roentgenograms will become confluent shadows of increased density in the most dependent areas of the lung where the vascular stasis is most marked. At this stage there is usually sympathetic "weeping" of the pleura from relative vascular stasis and fluid will collect in the dependent portion of the pleural space, producing a blunting of the costophrenic angles in the erect position.

In long standing cases of pulmo-

nary congestion due to mitral disease the red blood cells seeping into the lung parenchyma may break down and leave deposits of hemosiderin in the lung, producing a fine miliary mottling which may simulate miliary tuberculosis. Pulmonary edema may occur with vascular congestion or separately. It is usually seen in acute heart failure.

In patients sick enough to require hospitalization for acute myocardial infarction, acute pulmonary edema with pulmonary vascular engorgement and congestion is the single most frequent finding, even more frequent than cardiac enlargement. This is an important distinction because edema may simulate pneumonia or pulmonary infarction.

Radiologically, pulmonary edema presents granular or confluent patches of increased density, but less dense than corresponding areas of consolidation. The distribution is usually bilateral and perihilar. Asymmetrical localized pulmonary edema may occur. This localization has been attributed to locus minoris resistentiae, secondary to antecedent injury, presumably to the lymphatics.

Any type of failing heart may produce pulmonary congestion and edema. The lower the serum proteins, the less the degree of failure necessary to produce the same changes. This accounts in part for the common occurrence of marked edema in acute nephritis and occasionally in beriberi heart disease, with mild degree of permanent myocardial damage.

Among the important extracardiac roentgen observations which aid in cardiac diagnosis is the detection of concave notches on the lower borders of the ribs produced by the tortuous

enlarged intercostal arteries of the collateral circulation in coarctation of the aorta. These notches are always bilateral and usually involve the lower borders of the third to ninth ribs posteriorly. Their presence is pathognomonic. The typical case will also show a moderately enlarged left ventricle, a widening of the supraaortic shadow, and lack of prominence of the normal aortic knob. The rib notches are rarely seen in patients less than fifteen years old as it takes some years for the erosion of the ribs to develop. Radiology is responsible for the initial diagnosis in the majority of these cases.

The vascular ring is a developmental anomaly in which two aortic arches develop, enclosing the trachea and esophagus and often resulting in respiratory stridor or dysphagia or both. A barium swallow will show a concave indentation in the esophagus posteriorly. The trachea will show a similar defect anteriorly at the level of the aortic arch. Lipiodol instillation into the trachea may be necessary to demonstrate the latter.

This is not to be confused with the simple anomalous right aorta without the vascular ring. In this condition the single anomalous aorta passes either in front of or behind the esophagus and then pursues a course to the right of the spine. If behind the esophagus it will produce a similar concave defect in the visualized esophagus but no defect in the trachea. It also may give rise to dysphagia, sometimes not until late in life, presumably because the aorta becomes larger and more tortuous due to arteriosclerosis, thus increasing pressure symptoms.

The aberrant right subclavian ar-

tery usually arises from the descending aorta on the left and passes obliquely upward to the right behind the esophagus, producing a characteristic oblique compression of the barium-filled esophagus.

Aortic aneurysms which are notoriously "silent" clinically, especially in the descending thoracic aorta, may readily be revealed on roentgenograms as an abnormal mass. The differential diagnosis from tumor, especially lymphoma, may be exceedingly difficult. Fluoroscopy is of relatively little value as the commonly described characteristic pulsations of aneurysms are not usually demonstrable, presumably due to the organized laminated blood clots lining the sacs which are almost always present. If calcification is seen in the wall, the diagnosis of aneurysm becomes apparent. A Bucky film of the chest may be necessary. Dissecting aneurysms are not readily recognized in roentgenograms.

Finally, a valuable function of radiology in the study of the heart is detection of extracardiac conditions symptomatically simulating heart disease. More than half the patients sent to the radiologist for cardiac examination are eventually found not to have heart diseases. In many cases the x-ray examination helps by detecting emphysema, carcinoma of the lung, mediastinal tumor, bronchiectasis, pneumothorax, gallstones, or other conditions which are producing symptoms simulating heart disease.

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Recent Progress in Electrocardiography

CLAYTON J. LUNDY, M.D.*

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Prepared for Modern Medicine

IN the medical field too great a reliance is placed on laboratory procedures. While electrocardiographic patterns may be diagnostic, many, due to entirely different disease entities, are practically indistinguishable from each other. The electrocardiogram must always be examined in the light of the clinical situation.

Extreme variations in the normal pattern of the composite electrocardiogram have made establishment of electrocardiographic technic a long, slow process. Rapid progress is now being made, however, largely as a result of work by Dr. Frank N. Wilson and his collaborators at the University of Michigan, particularly that on unipolar leads. By means of these, the influence of the electrical potential developed at a single site on the body surface may be studied.

During the previous sixty-three years, most of our information was secured from bipolar leads, that is, leads connecting two points relatively close to the heart which are influenced by electrical potentials developed within the heart.

At present, helpful data are obtained by studying electrocardiograms secured from the right arm, left arm,

left leg, and certain standard points on the chest. Accepted practice is to take bipolar and unipolar limb leads and at least three chest leads. This multiplicity of leads, nine in all, is confusing to many physicians. Since our knowledge of electrocardiography in the preceding fifty-eight years has consisted of composite electrocardiograms, it is natural that we still use them, and perhaps we always shall, but the unipolar leads may replace the bipolar leads.

Much confusion is eliminated by new knowledge which permits classification of findings on a more uniform basis. This improved classification has been aided by Dr. Emanuel Goldberger's introduction of the augmented unipolar leads.

It probably is advisable to mention briefly here the established knowledge of cardiac pathology gained by bipolar electrocardiography and which probably will not be improved upon by the newer unipolar leads.

THE ARRHYTHMIAS

Sinus arrhythmia is a physiologic arrhythmia associated with respiration, in which the heart rate speeds during inspiration and slows during

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expiration. The chronologic relationships of the components of the single heart beat cycle, that is, P wave, QRS complex, and T wave, are undisturbed.

Extrasystoles are premature beats, usually followed by a long or compensatory pause, and may arise in any part of the heart. These are usually considered, and probably are, benign, unless they occur too often, as in bigeminy, when every other beat is an extrasystole. Also, *paroxysmal tachycardia* may appear when innumerable premature beats occur in runs lasting several minutes to several hours or even days. The longer the paroxysmal tachycardia lasts and the more frequent the attacks, the more important does this arrhythmia become.

Auricular fibrillation and *auricular flutter* may be chronic or paroxysmal and likewise become of increasing significance the longer they last. If they are paroxysmal, their importance increases the oftener they occur. *Ventricular fibrillation* is usually paroxysmal and of short duration. Death ensues if it persists for any length of time.

Heart block, in which the initiating stimulus fails to arise or fails in its usual propagation over the normal pathways of the heart, may occur in any part of the cardiac conduction system. It may appear at the site of origin of the heart beat in the sinus node located in the auricles, in which case it is called *sinus node block*; in the A-V node and His bundle, when it is called *A-V nodal block*; or in the branches of the His bundle, when it is called *bundle-branch block*.

Any of these blocks may be complete or incomplete. Complete sinus node block is also known as *cardiac arrest* and may possibly be the cause

of some sudden deaths, probably, however, in only a small percentage of cases.

Drug effects are pretty well recognized in the standard bipolar leads. Digitalis effects are usually manifested by frequent premature beats; often by bigeminy; a slurring of the downstroke of the RS portion of the ventricular QRS complex, causing a widening of that complex; a gradually increasing deformity of the proximal limb of the T waves, later giving a straight line descent of an inverted or diphasic T wave, and eventually a deeply curved dip of the proximal limb of the T wave. This may be in association with prolongation of the PR interval or actual heart block.

Digitalis effects may last for as long as three weeks after administration and frequently confuse the interpretation of the associated pathologic findings in the electrocardiogram. These findings may be augmented or completely masked by the influence of *digitalis*. The effects of quinidine and aminophylline are not so well defined. They usually affect the RT segment and the T wave.

Several other diagnostic entities revealed by the standard (bipolar) limb leads have become better established owing to confirmation in the unipolar limb leads and in the precordial leads.

NEW DEVELOPMENTS

Left ventricular hypertrophy (normal horizontal heart)—Shifting of the electrical axis was formerly known as left or right axis deviation. While it was generally recognized that short, thick-chested, and especially obese individuals might show left axis devia-

tion and still have normal hearts, differentiation of the normal horizontal heart from left ventricular hypertrophy is now easier to establish—by means of mensuration in the standard leads.

Left ventricular hypertrophy is assumed when the voltage of the R wave in lead 1 and the S wave in lead 3 is greater than 2.5 millivolts. Confirmation is obtained in the unipolar limb lead derived from the left arm lead, aVL, when the voltage of R is greater than 1.0 millivolt. Further confirmation is possible when the voltage of R is greater than 2.5 millivolts in the chest leads from the left side of the heart, leads CF or V-4-5-6.

There are additional, less important variations of the QRS complex in the different groups of leads. One of the more common is that with left ventricular hypertrophy, the QRS complex in the chest leads may show an R wave of prolonged duration, measuring 0.04 and 0.05 seconds from its beginning to the peak of the R wave.

Increased voltage of the T waves and inversion of the T waves in leads CF or V-4-5-6 may also be signs of left ventricular hypertrophy.

Without these increased measurements, we assume that although the heart is horizontal, it is of normal size. Such an assumption will be correct in more than 80% of cases and will apply to the heart in a normal median as well as horizontal position.

Left ventricular hypertrophy (heart in median position)—If the left ventricle is hypertrophied, the electrical axis rotates to the left. This shift may be so small as to be undetectable clinically or by x-rays. The difference between the roentgen appearance in

systole and diastole is often mistaken for an increased heart size. The increased measurements of the QRS complexes already mentioned constitute electrocardiographic evidence of left ventricular hypertrophy, even in the median positioned heart.

The chief differences between left ventricular hypertrophy in the two conditions are that, in the horizontal position, varying degrees of left axis deviation are observed in the standard limb leads and varying degrees of inversion of QRS in the unipolar limb lead aVF, even without left ventricular hypertrophy. When the heart in the median position does not have left ventricular hypertrophy, the electrical axis in the standard limb leads is usually normal and QRS in the unipolar limb lead aVF upright.

Left ventricular hypertrophy (normal vertical heart)—It is well known that in the normal sized vertical heart there is a tendency to right axis deviation in the standard limb leads and that QRS in the unipolar limb lead from the left arm, lead aVL, is diphasic or inverted. The methods of determining left ventricular hypertrophy described above hold true for the normal vertical heart except that the increased measurements may be more pronounced in the chest leads CF or V-3-4-5 than in leads CF or V-4-5-6.

Left ventricular strain—This condition is not well understood. The word "strain" would lead one to suspect that the term means current of injury produced by the unusual stress on the heart muscle by valvular injury imposing greater loads on the different chambers of the heart, eventually stretching the muscle comprising those chambers to such a point that muscle injury results.

Such injury might be so slight as to mean merely incomplete chemical recovery from the work of the preceding heart beat, with a gradual accumulation of the products of metabolism producing localized acidosis or accumulation of lactic acid.

Through weakening of the heart muscle, it may be that the stretching could produce mechanical injury and thereby produce current of injury. A combination of these factors may take place. Obstruction to outflow, as in extensive sclerosis of the aorta or in hypertension, may operate in the same manner as valvular deformities to produce such injury.

The differentiation of left ventricular hypertrophy from left ventricular strain, therefore, depends upon the definition. It is our contention that there should be a distinction, because left ventricular strain can occur without hypertrophy, as is seen just after cardiac infarction and in simple tachycardia. When evidences of left ventricular strain are transitory, they are usually reversible and probably not associated with permanent injury.

An exception, of course, immediately arises in the case of cardiac infarction when heart muscle is injured. Attention is called to the probable existence of a peripheral zone of temporary injury due to transitory ischemia, which might be distinguished from the central region of injury which suffers death or permanent injury. The temporarily ischemic peripheral zone will recover and no longer manifest current of injury. The central, permanently injured zone will die and become scarred, and the fibrotic heart muscle will give either no current of injury or not enough to influence the electrocardiogram.

It may not be feasible to try to distinguish between left ventricular hypertrophy and left ventricular strain, but one conception would be that the simple increased measurements, enumerated above, would constitute evidence of hypertrophy, whereas deviation of the RT segments and inverted T waves could be interpreted as indicating strain. The most probable objection to this is that ventricular hypertrophy alone may cause some inversions of T waves. While admitting this point, it might be added that under these circumstances there is an insensible and possibly inseparable gradual appearance of this inverted T wave, in which the depressed RT segment may precede the inverted T wave. Also, the inverted T wave may constitute the combined evidence of hypertrophy and strain, according to the above definition.

With this in mind, the evidences of left ventricular strain are manifested in the horizontal and median positioned heart by depressed RT segments in leads 1 and 2 of the standard limb leads, unipolar limb lead from the left leg, aVF, and the chest leads CF or V-4-5-6. At times the RT segment in the unipolar limb lead from the right arm, aVR, is elevated. Inverted T waves in these same leads, without RT deviation, may constitute simple strain alone without hypertrophy. But until this possibility has received more proof, strain should probably be considered in association with hypertrophy, with the exception that in lead aVR the T wave is upright instead of inverted.

Left ventricular strain in the vertical heart may show an RT depression in leads 2 and 3 and, of course,

(Continued on page 118)

Right Heart Catheterization in Congenital Heart Disease

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Prepared for Modern Medicine

VENOUS catheterization consists of introducing a radiopaque catheter into an arm vein and directing it fluoroscopically into the superior vena cava, right auricle, right ventricle, and pulmonary artery. In these chambers pressures may be recorded and blood samples withdrawn from various parts and analyzed for their content of oxygen.

Venous catheterization may be performed at almost any age. Under the age of five, a general anesthetic must often be used. Over the age of ten, local anesthesia at the venotomy site suffices. In infants, the jugular is the vein of choice although the saphenous-femoral system has been used by some. Thrombosis and pulmonary embolism is always a potential hazard if the lower extremity is employed, but not with the upper extremity. Already one death from this source has been reported. It is the author's belief that the lower extremity should not be used for introducing the catheter into the vascular system unless the dangers are carefully weighed against the benefits to be derived from the procedure.

The only other source of danger is ventricular fibrillation, of which there have been several unreported in-

stances. This complication is apparently caused by the tip of the catheter beating against the right ventricular endocardium. The tip of the catheter should not be allowed to lie free in the chamber of the right ventricle any longer than necessary.

We believe that venous catheterization is contraindicated in the presence of spontaneous ventricular premature beats, chronic auricular fibrillation, recent coronary occlusion, subacute bacterial endocarditis, and blood dyscrasias with bleeding tendencies, although exceptions have been made by us when advantages outweighed the hazards. Advanced cardiac failure, uremia, pulmonary insufficiency, old age, and the like have not been considered contraindications by us.

Although heparin is widely used as an anticoagulant in the saline drip through the catheter, we have preferred to avoid its use because of the tendency in dogs for subendothelial hematomas to form in the heart following the procedure. Lesions of this sort have not, however, been observed in man.

Although it seems unlikely that subacute bacterial endocarditis can arise as a result of venous catheterization,

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50,000 units of penicillin is administered routinely before and after the procedure. The danger of exposure to x-rays is usually greater for the operator than for the patient, but exists for both.

The diagnosis of congenital heart lesions is frequently difficult to make, partly because of the relative infrequency of such lesions, partly because of the lack of pathognomonic symptoms and signs, and partly because of the multiplicity of defects that may exist in the same heart. The rapid progress in thoracic and vascular surgery in the past decade has necessitated precise preoperative diagnosis of congenital heart disease, and venous catheterization has been found of value in this regard, although there are limitations which should be appreciated. A description of the diagnostic value of this technic and some of its limitations follows.

Pulmonary stenosis—If the catheter can be introduced through the stenotic pulmonary valve, a lower systolic pressure will be found in the pulmonary artery than in the right ventricle. This finding is pathognomonic for pulmonic stenosis and is probably the most sensitive and accurate test for the disorder.

Tetralogy of Fallot—Diagnosis of this as well as other congenital defects by venous catheterization is by inference rather than by direct demonstration. The catheter may pass through the pulmonary valve and pulmonic stenosis be demonstrated by pressure tracing. If the systolic pressure in a systemic artery (radial, brachial, or femoral) is identical with that in the right ventricle, it has been found, with considerable autopsy confirmation, that dextroposition of the aorta

is present. That is, the aorta overrides both right and left ventricles, which act as common chambers functionally, despite the presence of a septum of greater or lesser degree between these two chambers.

In many cases, the catheter passes from right ventricle to aorta, thereby demonstrating the presence of dextroposition of the aorta. In this circumstance, only rarely may the catheter be guided also into the pulmonary artery from the right ventricle. The systolic pressures in the aorta and right ventricle are identical, confirming the presence of dextroposition. Since the catheter has not entered the pulmonary artery, pulmonic stenosis must be inferred by the high pressure in the right ventricle and by the reduction of the pulmonary vascular markings in the roentgenogram.

These are the essential catheterization findings with the tetralogy of Fallot and their diagnostic reliability is high, as indicated by postmortem confirmation.

Eisenmenger's complex—This complex is anatomically the same as the tetralogy of Fallot except for the absence of pulmonic stenosis. The diagnosis by venous catheterization depends on finding identical systolic pressures in a systemic artery and right ventricle, indicating dextroposition of the aorta, and in right ventricle and pulmonary artery, indicating the absence of pulmonic stenosis.

In certain cases of ventricular septal defect with left-to-right shunt, systolic pressures in right ventricle and pulmonary artery are equal but are not as high as the pressure in a systemic artery. The question then arises as to whether this is a case of Eisenmenger's complex without sufficient overriding

to produce identical systolic pressures in the three areas or a case of ventricular septal defect with pulmonary vascular disease but without overriding of the aorta. To the author's knowledge, there have been no post-mortem examinations performed on patients with this phenomenon. Until such are done, decision regarding the exact morbid anatomy must be postponed.

With this exception, the diagnosis of Eisenmenger's complex by venous catheterization has a high degree of accuracy.

Patent ductus arteriosus—The murmur in this condition is usually pathognomonic but, in doubtful cases, venous catheterization may be of value. If multiple blood samples are withdrawn from pulmonary artery and right ventricle, normally there should be no greater oxygen variation in the maximal values obtained from each chamber than 0.5 volume per cent. A variation greater than this indicates the entrance of arterial blood into the pulmonary artery, as in patent ductus arteriosus and aortic septal defect. The latter lesion is relatively rare. The venous catheter technic is not much help in differentiating between these two conditions; perhaps angiocardiology* would be more helpful.

It is estimated that ductus shunts of 0.5 to 1.0 liter per minute or less will not be detected by venous catheterization unless a blood sample can be withdrawn from a point directly opposite the ductus so as to tap the stream of arterial blood coming from the aorta before it has mixed with the venous blood in the pulmonary artery. By present experience this would be fortuitous. It should likewise be re-

membered that blood samples removed from distal parts of the pulmonary artery may contain varying amounts of highly oxygenated blood aspirated back from the pulmonary capillary bed, thereby erroneously suggesting the presence of patent ductus arteriosus.

Ventricular septal defect—If multiple blood samples are withdrawn from right ventricle and right atrium, normally there should be no greater oxygen variation in the maximal values obtained from each chamber than 0.9 volume per cent. Greater variations than this indicate the entrance of arterial blood into the right ventricle. This finding usually means ventricular septal defect, although patent ductus arteriosus with pulmonary insufficiency, a not infrequent occurrence, may give similar results. Usually, there is no difficulty in differentiation by other means.

If a blood sample can be withdrawn from the precise area where arterial blood is streaming from left into right ventricle, the diagnostic accuracy is high. Unfortunately this is not always possible. It is estimated that defects allowing shunts of 1.5 to 2.0 liters per minute or less are not readily detectable by venous catheterization. Only occasionally may the catheter be introduced through the defect into the left ventricle to establish the diagnosis directly.

Atrial septal defect—If multiple samples of blood are withdrawn from the right atrium and superior vena cava, there should be no greater variation in maximal values of oxygen content under normal conditions than 1.9 volume per cent. A greater variation than this indicates the entrance of arterial blood into the right atrium.

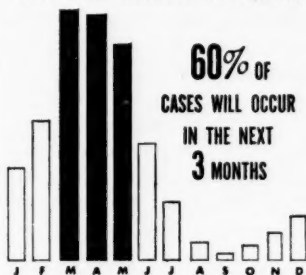
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This usually results from an atrial septal defect, but occasionally from an anomalous pulmonary vein emptying into the right atrium or from a ventricular septal defect with an associated tricuspid insufficiency.

The differentiation of these three conditions by other means usually presents no obstacle. Even so, the chances of error in using catheterization for the recognition of atrial septal defect are considerable. It is estimated that defects allowing a shunt of 4 to 5 liters per minute or less are not easily detected unless the tip of the catheter can be placed directly in the stream of arterial blood coming from the left auricle through the defect. An even more accurate method of detection is to guide the catheter through the defect into the left atrium. This can be accomplished with more ease by using the right arm for the introduction of the catheter into the heart.

Other defects—Venous catheterization is of little or no diagnostic value in *anomalies of the aortic arch* and in *coarctation of the aorta*. With *multiple lesions*, such as ventricular and atrial septal defects in the same patient, interpretation of results becomes increasingly difficult.

In *tricuspid atresia* with atrial septal defect, the venous catheter may be introduced through the defect into the left atrium, but no information regarding the tricuspid valve is obtained. On one occasion, *aortic septal defect* has been demonstrated by passage of the catheter from the pulmonary artery into the aorta, but in other suspected cases this could not be accomplished. The venous catheter does not give information regarding the size of defects between atria and between ventricles except in a very

indirect manner, that is, through estimation of the magnitude of the shunts.

An attempt has been made in the foregoing discussion to present the value of venous catheterization in the diagnosis of the principal types of congenital heart disease. As is the case in all methods, there are inherent limitations. It should not be considered as an isolated diagnostic technic, but should be used in conjunction with other methods in the total evaluation of the patient.

EXPERIMENTAL MEDICINE

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Investigations into the etiology of atheromatosis may be aided by a new procedure for producing the condition in chickens. Subcutaneous implantation of diethylstilbestrol causes sclerosis of the aorta in the fowl. Dr. I. L. Chaikoff of the University of California, San Francisco, and associates describe the hormone-induced lesion as more like those occurring spontaneously than those produced by cholesterol feeding. All three types, however, are fundamentally similar, differing only in the amounts and proportions of the various lipid constituents. Concentrations of cholesterol in plasma were the same but cholesterol constituted a greater proportion of the lipids deposited in the arterial walls of the cholesterol-fed than in those of the stilbestrol-treated birds. Thus the cholesterol content of the vascular lesion depends not only on the absolute concentration in plasma, but probably also on the proportion of cholesterol or other lipid constituents in plasma.

J. Exper. Med. 88:373-387, 1948.



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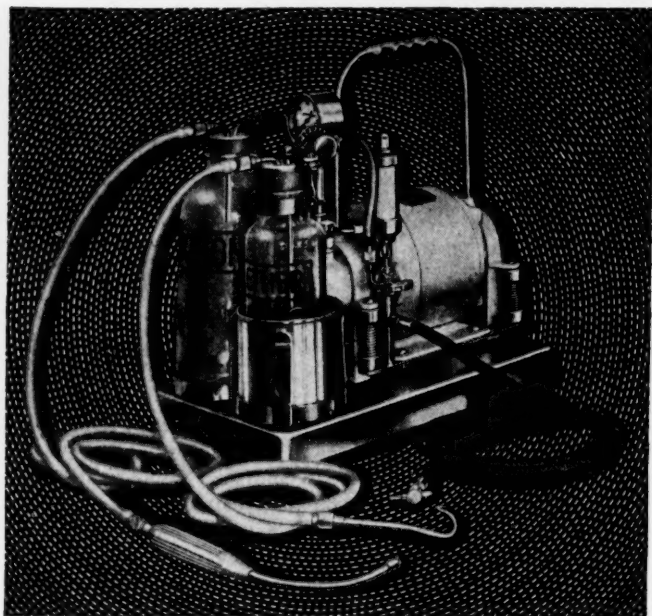
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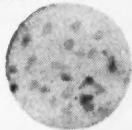
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Medical Forum

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Anesthesia for the Cardiac Patient

Dr. Vincent J. Collins replies to some points raised in a forum discussion of his paper (Nov. 15, 1948, p. 76).

TO THE EDITORS: The comments of Dr. William A. Butt dishearten me, as they should every anesthesiologist. The important principle necessary in the development of the specialty of anesthesia is individualization of cases—not the establishment of a routine. Routine smacks of the technician and is to be abhorred. The surgeon and/or anesthetist who insists on or utilizes only one agent and/or technic to the exclusion of others, regardless of the physical status of the patient, is to be deprecated.

I am as opposed to the anesthetist who uses cyclopropane for all cases of cardiac disease, or for all cases of whatsoever nature, as I am to the man who uses ether exclusively or who tries to perform the majority of cases under spinal anesthesia. Each agent, each technic has its place and utility in the anesthetist's armamentarium.

The statement about the noxious effect of cyclopropane requires clarification. Noxious is a generalization. Specifically, cyclopropane increases myocardial irritability, but is this

dangerous? Absolutely not! Arrhythmias are actually the only problem and can easily be treated with either procaine or intravenous quinidine in the majority of circumstances. When one is dealing with cardiac disease, again individualization must be emphasized.

Secondly, among informed anesthesiologists, cyclopropane for the cardiac patient is far from unpopular. Besides enabling patients to receive a high concentration of oxygen, it is the superior agent for use for the patient in shock, be he cardiac or otherwise, and furthermore it exerts but little influence on the endocrine system and hence is to be preferred in cardiac patients with diabetes.

Thirdly, as an example of individualization of anesthetic problems and surgical cases, one may consider the management of patients with stenotic valvular disease of the heart, such as a patient with mitral stenosis of rheumatic origin. In these cases it is highly desirable to have a slow pulse in order to allow sufficient time for diastolic filling of the cardiac chambers. A rapid pulse encroaches on filling time, particularly of the left ventricle, so that cardiac output is diminished. To achieve a slow pulse, cyclopropane is admirably suited. The bugbear of tachycardia or arrhythmia can be dismissed because of the ease with which



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vasoconstriction in minutes...

bacteriostasis for hours

these changes in rhythm can be controlled, as previously mentioned.

The next opinion, that intratracheal ether is "the anesthetic of choice for all cardiac cases," is completely fraught with danger and is a generalization. Generalizations have been aptly commented upon in the statement, "all generalizations are false including this one." The word *all* in medicine is pompous, intolerable, and unscientific.

One last point deserves mention. I cannot imagine anesthetizing any patient to adequate depth and performing intratracheal intubation routinely for the setting of a simple arm fracture, for a transurethral resection, for the amputation of a toe, for a hemorrhoidectomy, or for a host of other

minor surgical procedures. This is performing a major anesthetic technique for a minor operation. It is inconsistent. It is analogous to using a sledge hammer to drive a thumb tack. By the same token, to administer ether to all cardiac patients with clinical diabetes, with the necessary metabolic upset attendant upon such a procedure, cannot be considered wise.

Simplicity of technics and the use of agents based on physiologic, pharmacologic, and pathologic consideration aiming at a minimum of physiologic disturbance, and the judicious use of each available agent and technique as indicated are the utopian aim of each anesthesiologist.

VINCENT J. COLLINS, M.D.

New York City

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Assured Accuracy + Versatility



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Diagnostix

Here are diagnostic challenges presented as they confront the consultant from the first clue to the pathologic report. Diagnosis from the Clue requires unusual acumen and luck; from Part II, perspicacity; from Part III, discernment.

Case MM-137

THE CLUE

ATTENDING M.D.: The next patient is a seventy-year-old man, a banker in town, who was in good health so far as we know until 10 P.M. last night. He was playing bridge and drinking lemonade when he complained of a slight pain low in the abdomen. He excused himself, went to the bathroom, and vomited once. His wife took him home and called a physician, who advised a hot-water bottle to the abdomen, some sleeping medication, and aspirin.

VISITING M.D.: Apparently the pain was not severe?



ATTENDING M.D.: No, only moderate. However, he was unable to sleep. He vomited twice more and the pain continued. It was bilateral, but greater on the right than the left and radiated to the middle back. At 4 A.M. his physician sent him here by taxi. He did not seem critically ill and we considered . . .

PART II

ATTENDING M.D.: . . . appendicitis, diverticulitis, or carcinoma of the colon with threatening perforation, and acute enteritis.

VISITING M.D.: Why the last?

ATTENDING M.D.: Just before he was sent here he had one loose stool with bright red blood. I saw him shortly after he arrived and the physical examination was normal. The abdomen was soft, no masses were felt. Reflexes were normal.

VISITING M.D.: Blood pressure?

ATTENDING M.D.: 95/80.

VISITING M.D.: Any knowledge of angina or hypertension?

ATTENDING M.D.: No.

VISITING M.D.: (*Enters room*) Please continue . . .

ATTENDING M.D.: Two hours ago he became stuporous, ashen gray in color, and his speech was incoherent. Blood pressure dropped to 85/65; his temperature is now 95°.

External

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Anal Fissures, etc.

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Rash, Exanthema, Chafed and Irritated Skin
caused by Urine, Excrements or Friction, Prickly
Heat and in the nursery for General Infant Care.

Fatty acids and vitamins are in proper ratio,
thereby producing optimum results. Non irrit-
tant, acts as an antiphlogistic, allays pain, stim-
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TREGO, PRURITUS and URTICARIA. In 2
oz. Shaker-Top Cans.

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DESITIN

CHEMICAL COMPANY

VISITING M.D.: I see he is receiving a transfusion—for shock, I presume.

PART III

ATTENDING M.D.: About an hour ago he began to complain of leg pains.

VISITING M.D.: (*Examining fundi*) Perhaps we have a clue here . . . there are focal constrictions of the arterioles, considerable sclerosis of the retinal vessels, some hemorrhages and patchy exudate. He has had hypertension. (*Patient's breathing suddenly becomes shallow, his eyes roll up. He perspires excessively and dies*)

PART IV

VISITING M.D.: (*In autopsy room*) Sudden death following an illness of only a few hours, shock, moderate abdominal pain becoming worse, bloody diarrhea, back and leg pain, evidence of hypertension, all this spells dissecting aneurysm.

PATHOLOGIST: Here is the arterioscle-

rotic abdominal aneurysm with an anterior perforation and massive retroperitoneal hemorrhage.

VISITING M.D.: When a patient dies suddenly within minutes or hours my old professor used to say that the cause is usually one of three things—cerebral hemorrhage, coronary insufficiency, or dissecting aneurysm. If the patient was brought in in his pajamas, death was probably due to rupture of a cerebral vessel, which frequently happens during coitus. If the patient had a supply of small pills in his pocket, he probably died of heart disease. If he had a hot-water bottle to relieve pain in his back and legs, he probably had a dissecting aneurysm.

PATHOLOGIST: Eighty-five per cent of these patients have hypertension. The dissection usually begins just above the aortic leaflets and splits the layers of the aorta, pinching off the arteries as it goes. This patient had a perforated, not a dissecting aneurysm.



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TENSOR—the "live-rubber" thread elastic bandage assures uniform, controlled pressure without causing harmful constriction. Gives greater comfort and more freedom of movement, yet stays in

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Short Reports

METABOLISM

Cyclic Variations in Temperature and Pulse

Each individual has a metabolic pattern peculiar to himself. Mouth temperatures and heart rates fall into parallel diurnal curves that rise or fall according to the routine of existence. The curves are modified by work, meals, rest, sleep, excitement, menstruation, pregnancy, and, during winter when artificial heat is used indoors, by outdoor temperature. These findings were corroborated by Drs. N. Kleitman and A. Ramsarop of the University of Chicago from observation of 10 volunteers, 6 men and 4 women. Temperature and heart beat on arising are fairly constant from day to day and season to season. During the menstrual cycle, however, the temperature chart reveals two waves, the pulse chart one. Crossing of the temperature and heart curves permits a more exact determination of ovulation than temperature data alone. During the heating season body temperature and heart rate fall. Temperature and cardiac rate are higher in pregnancy and lower in lactation than during the menstrual cycle. Attending a movie raises the body temperature. Administration of desiccated thyroid raises temperature and pulse in a manner that allows these variables to be used as an index of changes in basal metabolism. When the temperature and heart rate vary in parallel fashion, a rise of one degree F. entails an increase of 10 to 20 beats per minute.

Endocrinology 43:1-20, 1948.

STATISTICS

Data on Suicides

Although the springtime is the peak season for suicides, only a few are associated with love affairs. This observation by Dr. Carleton Simon of New York, criminologist of the International Association of Police Chiefs, is based upon his own investigations and surveys of other police departments. The study also revealed that:

¶Homes having radios have the lowest suicide rate.

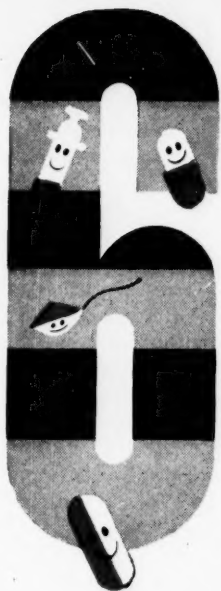
¶Alcoholism is a precipitating or accelerating factor in many cases.

PSYCHOTHERAPY

Relief of Adrenergic Symptoms

The sympatholytic drug, dibenamine (N,N. dibenzyl- β -chloro-ethylamine), is a valuable adjunct to psychotherapy for patients in whom anxiety, fear, panic, resentment, and anger are prominent psychopathologic features. Dr. Fred V. Rockwell of Cornell University, New York City, found that oral administration of dibenamine was of some benefit to each of 50 patients, but that the therapeutic effectiveness differed widely with the individual. Intravenous therapy is unsatisfactory. Relief from symptoms associated with emotions accompanied by an increased output of adrenalin is most consistently obtained by administration, three times a day, of enteric-coated tablets containing 240 mg. of dibenamine.

Psychosomatic Med. 10:230-237, 1948.



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6



Beminal
for
'B'
therapy

Paul Rand

Washington Letter

Voorhees report inspires minor reform in military medicine; Civilians take over Forrestal Committee; Oak Ridge trains foreign scientists; Army offers 300 residencies, internships

WASHINGTON, D. C.—Since publication of the Voorhees report, which disclosed widespread waste and mismanagement of federal medical services, the military medical departments have initiated some minor reforms.

The movement is stimulated by the Committee on Medical and Hospital Services of the Armed Forces, which has been studying the problem for more than a year. Originally the committee personnel was military, with the exception of Dr. Paul R. Hawley, the chairman.

Secretary Forrestal, however, took the committee out of military hands just a few days before the Voorhees

report came out criticizing the Army, Navy, and Air Force for their handling of hospital and medical programs. The civilians now outnumber the military members 8 to 4, so there's no possibility of a whitewash.

Here are some of the things the committee, headed by Charles Proctor Cooper of New York Presbyterian Hospital, has specifically recommended:

► A simplified and unified medical supply plan designed for all the services. The committee estimates that this would save \$1,000,000 a year.

► A reduction in the number of general hospitals by greater use by each service of the hospital facilities of the others. The committee also is urging that the medical specialist be assigned to the hospital where he will be the most effective, and not necessarily to the hospital where his particular service might want him assigned.

► The general adoption of a new standardized nomenclature of diseases, injuries, and conditions. An abridged



"If Mrs. Brown got 10 liver shots, I want at least 20."



"Yes, there's something you can do!"

The effectiveness of the well-known "A-P-C" formula, as best demonstrated in Anacin, has been established in thousands of cases of simple headache, neuritis and neuralgia. Anacin tablets work speedily—and for a prolonged period of time. When you consider using an A-P-C, consider Anacin. It is made to exacting standards for you and your patients.

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WHITEHALL PHARMACAL COMPANY • 22 East 40th Street, New York 16, N. Y.

Gelatine's effective hematopoietic action in **NUTRITIONAL ANEMIA**

Hemoglobin is a conjugated protein and depends upon a liberal dietary source of protein for its production in the treatment of anemia.

Knox Gelatine U.S.P., which is made of selected bone stock, has a good proportion of the amino acids found to be of hematopoietic value. One ounce of Knox unflavored gelatine daily, in divided doses with meals, taken in water, fruit juice or milk and in conjunction with suitable iron medication, has been found of value in nutritional anemia.

Knox unflavored Gelatine U.S.P., unlike the ready-flavored gelatine powders, is all protein, no sugar. So it is well to specify Knox by name.



nomenclature has already been approved for use of all services and may be in general use by midsummer.

One result of this current pressure for more efficiency has been noted. The Veterans Administration, which was planning to build a \$21,000,000 hospital at Houston, has taken over a Navy hospital there instead.

This year's version of the National Health Insurance Bill is exactly the same as last year's, down to the last comma. However, the sponsors may agree to some administrative alterations, readjustment of the timing for certain phases of the program, and a substitute section on training.

The sponsors are the same, Senators J. Howard McGrath, Rhode Island Democrat and chairman of the party's national committee; Robert F. Wagner, New York Democrat; James E. Murray, Montana Democrat, and Rep. John D. Dingell, Michigan Democrat.

A newcomer, Sen. Hubert Humphrey of Minnesota, has been named to the committee which will handle this bill. He is one of the country's most consistent and persistent advocates of a national compulsory health plan.

The committee, one of the most overworked in the Senate, handles labor and welfare legislation.

This means the committee is responsible for four of President Truman's major projects, a new labor bill, an increase in minimum wage

What's New in

ARTHRITIS NUTRITION
ANTIBIOTICS BLOOD DISORDERS
DRUG THERAPY DERMATOLOGY

Read SYMPOSIUM on
RESEARCH PROGRESS

Modern Medicine—March 15

SERENDIPITY

"The ability of finding valuable things unexpectedly."—WEBSTER'S DICTIONARY.

In 1492 Columbus sailed westward from Spain to find a short route to India. Like the Three Princes of Serendip he made a far more important discovery—America.

In 1944 VAN PATTEN sponsored extensive medical research on dehydrated garlic (*allium sativum*) to determine its therapeutic value for functional gastro-intestinal conditions. After five years of careful study, an important discovery was made.

It was found that garlic contains unidentified principles which relax gastric and intestinal spasm, retard excessive peristalsis, and effectively relieve the distressing symptoms of flatulent or nervous dyspepsia. To these therapeutic factors collectively the name *gastro-enteric allichalons* has been applied (*allium*, garlic; *chalone*, to relax).

Comparison roentgenograms show conclusively that ALLIMIN Garlic Tablets have a sedative action on the stomach and intestines.

Clinical results in a series of cases of functional dyspepsia and gastric neuroses were impressive:

Heaviness after meals relieved in 84% of all cases; complete relief in 60% of all cases.

Belching relieved in 88% of all cases; complete relief in 52% of all cases.

HOW SUPPLIED. ALLIMIN is supplied in cellophaned packages of 25, 60 and 250 sugar-coated tablets.

Allimin

The Safe and Effective Carminative
for Long-Continued Use

Flatulence relieved in 84% of all cases; complete relief in 80% of all cases.

Gas colic relieved in 87% of all cases; complete relief in 54% of all cases.

Nausea completely relieved in 75% of all cases.

THERAPEUTIC USES. The remarkable and unique carminative properties of ALLIMIN, now scientifically established by clinical research, may be used with prompt satisfaction in many functional gastro-intestinal conditions. The principal indications are in flatulent or nervous dyspepsia and in gastric neuroses.

For symptomatic relief, ALLIMIN may be prescribed with confidence for complaints of heaviness after meals (epigastric or abdominal distress), belching, flatulence, gas colic and nausea.

COMPOSITION. ALLIMIN Tablets contain 4¾ grains of dehydrated garlic, flavor modified with dried parsley and sugar-coated for palatability.

ADMINISTRATION. The recommended dosage is 2 tablets after meals with a little water. The tablets should be swallowed whole, not chewed. Medication should be continued three times daily, or after lunch and dinner when the patient eats a light breakfast, according to clinical progress and indications.

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ZONE

standards, federal aid to education, and the health program.

The health bill probably will be the last of the four to be reported out.

SEN. Virgil Chapman, Kentucky Democrat, who moved up from the House of Representatives, has some definite ideas about a health bill. He wants a lot done about public health, but he doesn't want anything like the Truman program. He is prepared to work hard for impressive grants to assist states, but he will work as hard to block anything that sounds like compulsory health insurance. Because he's been in the lower House for more than twenty years, Chapman carries more weight than do many new senators.

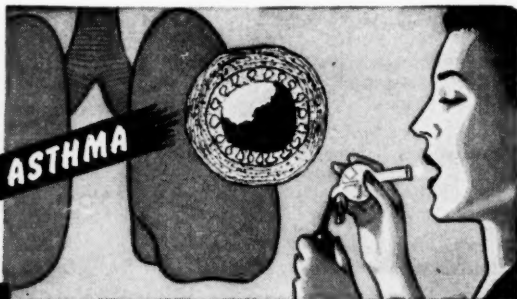
FACILITIES of the Oak Ridge Institute have been opened to foreigners who are using isotopes in research. The first two to enroll in the training course are from England and India.

Atomic Energy Commission decided to let in outsiders so that more scientists abroad could learn the essential safety technics for handling isotopes. Foreign countries now getting isotopes from Oak Ridge have been handicapped by lack of knowledge of how to use them safely.

THE Army is offering 300 residencies and internships to civilian physicians and another 300 to medical school graduates, to start July 1. A deadline of March 15 has been set for

**A Marked Increase
in Vital Capacity**

IN BRONCHIAL ASTHMA



*an especially purified synthetic
racemic epinephrine available
with Vaponefrin Nebulizer.

VAPONEFRIN Physicians Allergic Unit

Vaponefrin Solution,* as a bronchodilator administered by inhalation produces (1) marked increase in vital capacity through relief of bronchospasm; (2) prompt and prolonged relief of symptoms with minimum side-effects. Write for literature.

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for safe and effective
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L.A. **FORMULA**

L. A. Formula is indicated in the safe and effective prevention and treatment of chronic constipation. It supplies bulk and lubrication to the intestinal contents by absorbing water and produces normal peristalsis. L. A. Formula is easy-to-take and pleasant-to-take and furthermore, it's economical for those who feel that they "must take something every day." Prescribe it in the next case of chronic constipation. Send for a sample now.

Contains Plantago Ovata Concentrate with 50% dextrose as a dispersing agent.



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*THE ORIGINAL PLANTAGO OVATA CONCENTRATE

applications. They will get pay and allowances as first lieutenants and captains.

Most numerous openings are in internal medicine and otolaryngology. Other specialties are allergy, anesthesiology, cardiology, neuropsychiatry, neurology, obstetrics and gynecology, ophthalmology, pathology, pediatrics, physical medicine, plastic surgery, surgery, and urology. For details write to Chief, Procurement Branch, Personnel Division, Office of Surgeon General, Washington 25, D.C.

ARMY NOTES: Twenty-eight medical officers are teaching part time in civilian medical schools; by regulations they can't accept pay and much of the teaching is done on their own

time. . . . The Army will continue the civilian consultants program at least through this year. Under this plan three teams of two or three medical specialists are touring the Army medical bases abroad each month. They visit and inspect hospitals and lecture when time permits.

COMPLETE report on the smog disaster at Donora, Pa., where 20 persons died is being prepared by the U.S. Public Health Service. Nurses are making a house-to-house canvass of all those affected. These interviews will be supplemented by more detailed dental and medical examinations when advisable. The investigation also covers environment and meteorologic conditions.

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the chronically fatigued patient . . .
the hypotensive individual—the weary convalescent . . .

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Two Potencies: ½ Oral Rat Unit and 1 Oral Rat Unit, both in bottles of 20's and 100's.



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to adrenal
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Urinary Antiseptic of Choice—for the chronic ambulatory patient

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recognized as a medication that quickly controls most urinary infections,¹ is ideally suited for use in the management of the resistant case, e.g., neurogenic bladder, nephroptosis with pyelitis, cystitis, prostatitis, nonspecific urethritis, infections associated with urinary calculi, pyelonephritis, and pyelitis. It is being used routinely for the chronic ambulatory patient, since its administration is remarkably free from toxic reactions or the development of sensitization, drug-fastness, or urinary concretions.^{1,2,3} Moreover, the simplicity of the oral regimen increases the likelihood of faithful adherence to your instructions between office visits.

SUPPLIED: Enteric-coated tablets of 0.25 Gm. (3½ grains) each, bottles of 120, 500, and 1,000.

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- 1 No gastric upset
- 2 No dietary or fluid regulation
- 3 No supplementary acidification (except when urea-splitting organisms occur)
- 4 Wide antibacterial range
- 5 No danger of drug-fastness
- 6 Simplicity of regimen—3 or 4 tablets, t.i.d.

1 Carroll, G. and Allen, H. N. J. Urol. 58: 674 (1946). 2 Merricks, J. W. West Virginia M. J. 44: 157 (1948). 3 Scudt, J. V., and Duca, C. J. J. Urol. (to be published).

*MANDELAMINE is the registered trademark of Nepera Chemical Co., Inc. for its brand of Hexydaine (methenamine mandelate).

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Manufacturing Chemists

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Recent Progress in Electrocardiography

(Continued from page 91)

the T waves may also be inverted. That this is left ventricular strain and not right ventricular strain is confirmed by a diphasic or inverted QRS in lead aVL in the unipolar limb leads and the usual signs of left ventricular strain in the chest leads and unipolar limb lead aVF.

Right ventricular hypertrophy (normal vertical heart)—It has long been known that the normal sized vertical heart, seen in tall and slender individuals, produces a diphasic or partially inverted QRS complex in lead 1. This picture may be differentiated from that of right ventricular hypertrophy, but

probably not with the accuracy obtainable in differentiation of left ventricular hypertrophy from the normal horizontal heart, because right ventricular hypertrophy does not appear in as pure a form as left ventricular hypertrophy. In fact, combined hypertrophy of both ventricles can be assumed when the entire QRS complex is huge, but usually the left, and only occasionally the right ventricular hypertrophy dominates the picture.

In the standard leads, deep S waves in lead 1 with high R waves in lead 3 may mean either right ventricular

(Continued on page 122)



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Right, Professional Chair with Hydra-Lift

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Which would you prescribe for Infant Feeding?

NATURALLY, you'd choose a name you know . . . a name worthy of your confidence.

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It is evaporated, homogenized enriched in vitamin D, and sterilized, under the most rigid controls. Constant tests and vigilant inspection are your guarantee that every can bearing the name Carnation meets the highest requirements of the medical profession.

NO WONDER nation-wide surveys show *more babies are fed on Carnation than on any other brand of evaporated milk*. It's the milk you can confidently prescribe by name—day in and year out.



Nation-wide surveys show that Carnation Milk is more widely used in infant feeding than any other brand of evaporated milk.



The Milk Every Doctor Knows

"From Contented Cows"

Prove
CAMEL MILDNESS
for Yourself!

Two women are shown smiling and holding cigarettes. The woman in the foreground is larger and more prominent, wearing a headscarf and a dark jacket. The woman behind her is smaller and also smiling, holding a cigarette. A small rectangular box is placed over the woman in the background's mouth.

Money-Back Guarantee!

Test Camel Mildness for yourself in your own "T-Zone"—T for taste, T for throat. If, at any time, you are not convinced that Camels are the mildest cigarette you ever smoked, return the package with the unused Camels and we will refund its full purchase price, plus postage.

(Signed) R. J. Reynolds Tobacco Company, Winston-Salem, North Carolina.

In a recent coast to coast test of hundreds of people who smoked only Camels for 30 days, throat specialists, after weekly examinations, reported:

"Not one single case of throat irritation due to smoking CAMELS!"



Hundreds of men and women were included in this coast to coast test. These men and women smoked Camels—and only Camels—for 30 consecutive days. They smoked on the average of one to two packages a day. Each week noted throat specialists examined the throats of these Camel smokers—a total of 2470 careful examinations. In every report, the findings of these throat specialists were the same—"not one single case of throat irritation due to smoking Camels."



According to a Nationwide survey:
**MORE DOCTORS
SMOKE CAMELS**
than any other cigarette



Doctors smoke for pleasure, too! And when three leading independent research organizations asked 113,597 doctors what cigarette they smoked, the brand named most was Camel.

hypertrophy or a vertical heart. When these are seen with abnormally prolonged or high P waves, right ventricular hypertrophy is usually assumed to be present.

The precordial leads may confirm the diagnosis by presenting tall R waves from the right side of the heart, as for example in leads CF and V-1-2-3. These tall R waves may be associated with depressed RT segments and diphasic or inverted T waves. The QRS complex of the unipolar lead from the left arm (lead aVL) is often inverted, but this occurs probably more often with a vertical heart and cannot be used as certain evidence of right ventricular hypertrophy. With certain exceptions, the same electrocardiographic findings occur with the heart

in the median or horizontal positions.

Coronary disease—Chronic coronary disease may be the result of previous infarction, gradually increasing ischemia, or temporary occlusion, formerly considered as spasm of the coronary artery. From a clinical point of view, the differentiation between acute and chronic coronary disease may be difficult because infarction takes place silently in a small percentage of cases.

Chronic coronary disease is often shown by a slowly increasing PR interval approaching or exceeding the recognized limit of normal, which is 0.20 second. This indicates a low-grade heart block which may even progress to a higher grade with occasional dropped beats.

A similar observation is frequently

TO COMBAT IRRITATING COUGH

Effectively
Pleasantly

FORMULA—Each teaspoonful (5 cc.) represents:

Alcohol (by volume).....12 %
Codeine Phosphate.....5.5 mg.

(Warning: May be habit-forming)

Terpin Hydrate.....17.5 mg.
Chloroform.....0.3 %

Amino Acids and Polypeptides

Derived from Beef, Milk, and
Wheat, Equivalent to Proteins ... 2.0 %

Carbohydrates: Lactose, Dextrose
Cane Sugar.

ADULT DOSE: One teaspoonful every two
hours, or as determined by the physician.

LIQUID PEPTONIDS®

with TERPIN HYDRATE and CODEINE

Symptomatic relief—Expectorant action of terpin hydrate; sedative action of codeine phosphate; highly palatable LIQUID PEPTONIDS base—bottles of 4 fl. oz. LIQUID PEPTONIDS with CREOSOTE, favored when the action of creosote is desired—bottles of 6 and 12 fl. oz.

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made in rheumatic heart disease. Differentiation is usually on the basis of the patient's history and age. The gradual appearance of any sign of acute cardiac infarction may also be a manifestation of chronic coronary disease. The gradual widening of the QRS complex, without evidences of ventricular hypertrophy, is a not uncommon manifestation of chronic coronary disease.

Transitory ischemia—Any fraction of the changes described below under cardiac infarction may take place temporarily as a result of transient ischemia. The pathologic cause of transitory ischemia is thought to be a temporary diminution in the coronary blood flow to part of the heart muscle. The condition also can be due to in-

creased work demands upon the heart in the presence of a somewhat limited blood supply.

Cardiac infarction—This lesion is usually ushered in with dramatic symptoms that permit easy recognition. However, electrocardiographic confirmation is always advisable, since several other conditions can give a similar clinical picture. The more common of these are pulmonary infarct, spontaneous pneumothorax, peptic ulcer, gallstone colic, neuritis, herpes zoster, acute cardiac dilatation, and pericarditis.

Cardiac infarction varies in size from small symptomless regions to areas that involve two-thirds or more of the entire external wall of the ventricular musculature. The electrocar-

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diagram aids in determining the size, within certain limits. In general, the greater the deviation from normal and the greater the number of leads showing the acute changes, the greater the infarct. Conversely, the fewer the changes and the shorter their duration, the smaller the infarct. This may not be true in posterior infarction, in which the usual leads may not reveal the true extent of injury.

Anterior infarct—During the acute stage, the RT segment may be elevated in leads 1 and 2 and CF or V-2-3-4-5. Within a few minutes, hours, or days, the RT segment returns to normal and the corresponding T waves are inverted and have a cove-shaped appearance. These findings probably indicate an infarct extending across

the entire anterior wall of the heart. Any fraction of this pattern may occur and with small areas of anterior infarction it is possible to have no changes in the standard leads and changes in only one of the precordial leads.

Under these circumstances, it would be reasonable to conclude that the former case was a much larger infarct than the latter. Partial proof of this is manifested by the latter electrocardiograms showing rather complete healing from an electrocardiographic viewpoint, whereas the larger infarct usually leaves longer standing or even permanent changes. Also, with the larger infarcts prominent Q waves appear in the above mentioned leads. To have authoritative significance,



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they should amount to 0.03 or 0.04 second in duration. However, it is possible that Q waves of lesser duration may also be significant, especially if they appear after an acute episode diagnosed as an infarct.

Frequent electrocardiographic studies are of the utmost importance in doubtful cases since these signs of infarction may not appear for from twenty-four to forty-eight or more hours. When doubtful signs are present, a serial study must be made every day during the first three days, every other day for the next four days, and weekly thereafter for a month or two. Such a study will reveal progressive changes which are usually diagnostic of recent infarction.

With small infarcts it is often ad-

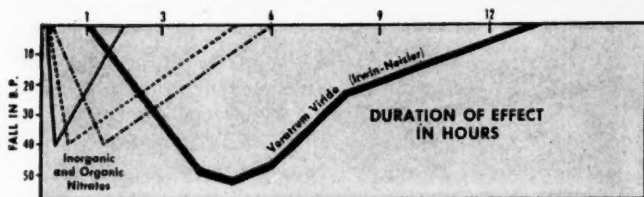
visable to take chest leads from the third interspace when tracings from the conventional fourth interspace are negative.

Anteroseptal infarct—This lesion occurs rather frequently and is manifested by the changes described under anterior infarct, plus evidence of widening of the QRS interval. It usually is a result of involvement of the conduction system in the anterior portion of the septum.

Posterior infarct—This condition is ordinarily diagnosed by changes in the standard limb leads or the unipolar limb lead from the left leg. In the acute stage, these consist of an elevation of the RT segment in leads 2 and 3 and aVF which, in varying periods of time, recede to the base



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To Dunk or Not To Dunk?

Dunking doughnuts is Sober Hopkins' favorite morning pastime ... and for a long time Ma Hopkins has been trying to break him of the habit. Feels it sets a bad example for the children.

So one morning she puts a heavy frosting of chocolate on the doughnuts...figuring that will stop him. Sober thinks it over for a while and then: Dunk! Taste? Smile!! And Sober compliments the missus on the lovely mocha flavor!

I guess there'll always be two schools of thought: to dunk or not to dunk. But from where I sit, it's a matter of personal choice and taste—like some folks prefer beer to cider, ale to beer. And the less we criticize those differences of taste, the better.

In fact, Ma Hopkins got so curious about the flavor of chocolate-covered doughnuts dunked in coffee, that she tried it herself. Now—you've guessed it—she's a daily dunker, too!

Joe Marsh

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line, accompanied by an inverted cove-shaped T wave.

An unknown number of posterior infarcts cannot be diagnosed by this current standard procedure. Therefore, leads are taken from the lower end of the sternum, the right hypochondrium, and left infrascapular region. Special leads are also secured by introducing an electrode via the esophagus and placing it at the level of the ventricles. In this way, current of injury as a result of posterior infarction becomes manifest in a small percentage of cases which do not show the changes in the conventional leads. Special electrodes are available for esophageal leads.

Posterior septal infarct—Septal involvement probably occurs at least twice as often with posterior infarction as with anterior infarction. The electrocardiographic manifestations of posterior septal involvement include any of the changes seen with posterior infarct, plus manifestations of widened QRS complex as in bundle-branch block.

It should again be emphasized that these acute changes are usually present within twenty-four or forty-eight hours after onset of symptoms, but sometimes not for seventy-two hours. When electrocardiograms are made within a few hours after onset, confirmation may be missed. For this reason, electrocardiograms should be taken daily for at least three days after an episode suggesting cardiac infarction.

Serial electrocardiograms—Study by serial electrocardiograms is imperative in following the course of cardiac infarction. The longer the RT segments remain elevated, the poorer the prognosis with a large infarct. Dicumarol seems to increase the persistence of this sign and, as experience with dicu-

marol is gained, we may change our attitude.

Serial electrocardiograms are of great importance for detecting infarction during the early stages when the patient exhibits mild symptoms of a temporary and seemingly innocent nature. Persistence of an altered electrocardiogram is a rough measure of the amount of damage the heart has sustained.

SPECIAL CLINICAL CONDITIONS

Pericarditis—While the standard limb leads usually give evidence of pericarditis, changes are also observed in the other series of leads. In the standard limb leads, the RT segment may be elevated in all three leads, followed by inversion or partial inversion of the T waves. On occasion, the elevation may be found in leads 1 and 2 or 2 and 3, or even in a single lead.

Differentiation from acute cardiac infarction is generally accomplished by the realization that in pericarditis the RT elevations are usually less marked and of much longer duration than in acute infarction. The same changes may take place in the chest leads and in the unipolar limb leads from the left arm, aVL, and the left leg, aVF, whereas in lead aVF the RT segment will be depressed. The T waves may reverse to the opposite direction. As a rule, wide Q waves do not occur in the QRS complexes unless pericarditis complicates an infarct, and the wide Q is probably due to the infarction.

Pericardial effusion itself probably produces no change in the electrocardiographic pattern except to reduce the voltage of any or all of the complexes.

Pulmonary infarct—Electrocardiographic changes seen in this condi-

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tion vary with the size of the infarct. Acute cor pulmonale may occur with large pulmonary infarcts. Under these circumstances, the standard limb leads show right axis deviation with a deep S wave in lead 1 and depression of the RT segments in leads 2 and 3 and inverted T waves in leads 2 and 3. The deep S wave in lead 1 is often prolonged to as much as 0.06 second or more and resembles right bundle-branch block when associated with a QRS interval of 0.12 second.

Some pulmonary infarcts show a depression of the RT segment in lead 1, but always in association with the deep or broad S waves. Since an infarct may be massive or small, any fraction of the above signs will constitute electrocardiographic evidence

of pulmonary infarct. The sudden appearance of an S wave in lead 1 would constitute diagnostic evidence of the condition, especially if a previous electrocardiogram did not show these findings. The changes are often transitory and may appear for only a few hours or days, usually depending upon the size of the infarct.

Because of the variability of the electrocardiographic pattern, standards are not established so well in the other sets of leads. The unipolar limb leads and chest leads may show changes similar to those in right ventricular hypertrophy, possibly because of the associated dilatation of the right ventricle.

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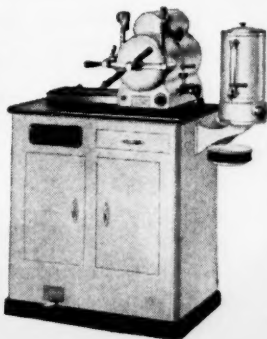
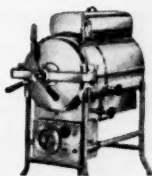
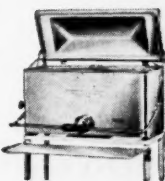
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usually occurs with hypothyroidism. Myxedema hearts and hearts with lesser grades of hypothyroidism may even show inversion of the T waves and in tall, slender individuals will often present inverted T waves in lead 1, perhaps due to the combined effects of the hypothyroidism and the vertical position. Overactive individuals and persons with slightly elevated blood pressure may present cove-shaped inverted T waves very similar to those which are observed in cardiac infarction.

Thyroid administration usually corrects these abnormalities. The physician has courage to administer thyroid in such a case because the history is usually not that of an attack of coronary thrombosis but rather one of undue fatigue.

Vitamin B deficiency—Changes very similar to those seen in hypothyroidism are seen in vitamin B deficiency (beriberi heart). The changes are principally associated with the T waves, but the QRS complexes may also present low voltage.

Potassium influences—Hypopotassemia usually causes low voltage of the T waves. This is probably not so marked as in hypothyroidism and vitamin B deficiencies. However, the

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condition always should be differentiated.

Hyperpotassemia is associated with high voltage of the T waves. They differ from the T waves seen in ventricular hypertrophy by a somewhat shorter duration.

Ventricular aneurysm—Following cardiac infarct, a small percentage of patients show aneurysm of the ventricular musculature. This is characterized electrocardiographically by persistence of permanently inverted T waves to an unusual degree. The leads in which the T waves are inverted depend upon the location of the infarct.

Auricular hypertrophy—In the past, auricular hypertrophy has been considered synonymous with increased pulmonary tension. However, since intracardiac catheterization study, this association is being questioned.

The electrocardiographic characteristics of auricular hypertrophy are broadened, notched, or flattened P waves of greater than 0.10 second; notched or inverted P waves; and peaked P waves of high voltage greater than 0.2 millivolt. Pardee states that any two of these conditions in the standard leads permit the diagnosis.

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- THE MEDICAL ANNUAL 1948 edited by Sir Henry Tidy and A. Rendle Short. 414 pp. John Wright & Sons, Bristol, England. 25s.
- INTRODUCTION TO DISEASES OF THE CHEST by J. Maxwell. 3d ed. 307 pp. Hodder & Stoughton, London. 12s. 6d.
- LA DENUTRITION: CLINIQUE, BIOLOGIE, THÉRAPEUTIQUE by Maurice Lamy *et al.* 407 pp. ill. G. Doin & Co., Paris. 1150 fr.

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- DRUG RESEARCH AND DEVELOPMENT edited by Austin Smith and Arthur D. Herick. 596 pp. Revere Publishing Co., New York City. \$10
- THE LITERATURE ON STREPTOMYCIN, 1944-1948 compiled by Selman A. Waksman. 127 pp. Rutgers University Press, New Brunswick, N. J. \$3
- PHARMACY FORWARD, BEING SELECTIONS FROM THE DIARY, SPEECHES AND REPORTS OF FREDERICK JOHN WULLING. 123 pp. ill. Emerson G. Wulling, 613 N. 22d St., La Crosse, Wis. \$3

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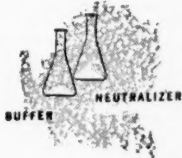
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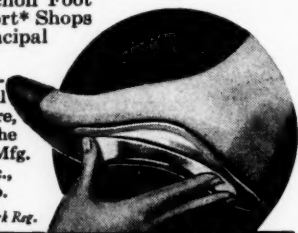
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The editors will pay \$1 for each story published. No contributions will be returned. Send your experiences to the Patients I Have Met Editor, MODERN MEDICINE, 84 South Tenth St., Minneapolis 3, Minn.

A patient was sent to me for an x-ray of her injured ankle. When I presented her with a bill for \$7.50 she was furious. "Seven-fifty!" she shouted. "Why, they have been x-raying my feet free for years at the shoe store."—E.M.

For five years a man and his wife had tried to have a baby, but to no avail. Finally Liza went to the doctor. After he had examined her, the doctor said, "Liza, I think I know what is wrong with you. You are probably deficient in your passion, and if you ever have a baby, it will be a miracle."

When Liza went back home heartbroken and blue, Rastus asked, "Liza, honey, what's the matter. What did the doctor say to you today?"

Liza wailed, "Oh, Rastus, honey, the doctor says I got a fish in my passage and if I ever have a baby it will be a mackerel."—M.H.



"But, Doctor, just because I happen to be fond of cats, is that any reason why my relatives should want to have me put away?"

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"She said if I could stick it out for five minutes she'd take me home!"—I.H.O.

"Doc, you got to give me something for my wife's diary, she had it now for two days."—W.P.P.

Not Cervix Connected?

While writing up a routine prenatal history, the very anxious father-to-be answered all of my questions, not giving his wife a chance. When I asked if she had a discharge, the husband replied, "Oh no! She has never even been in the Service!"—K.W.M.

To Make Him Forget

While taking a history of a new patient who had symptoms of peptic ulcer, I inquired, "And do you take any medicine for your discomfort?"

"Yes," he replied, "I take a lot of that amnesia trisilicate."—J.M.K.

About Face

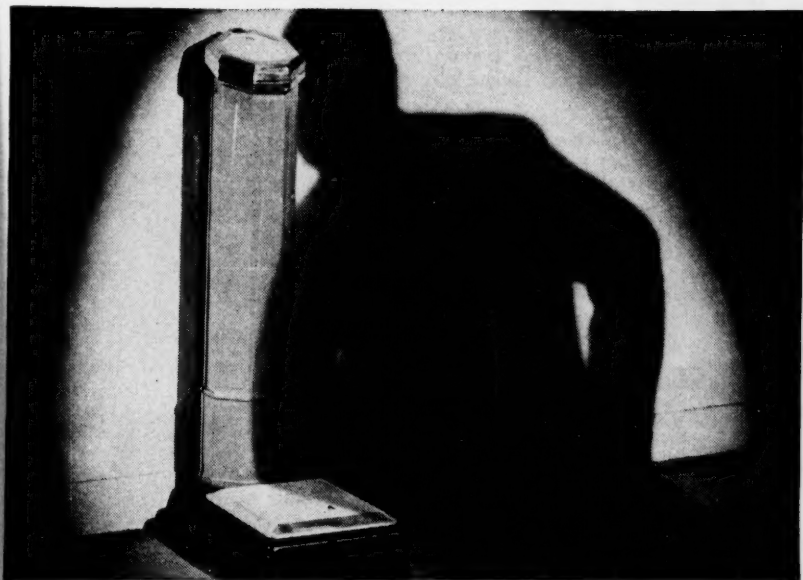
"As I understand it, you and your husband had an altercation and you were kicked in the ensuing rumphus. Is that right?"

"No, suh, doc. Ah was kicked in da stummick!"—C.O.



"Tonsillectomy, appendectomy, hysterectomy. That's about enough out of you."

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Preliminary studies indicate that molds of the genus *fusarium* are capable of converting carbohydrate to certain fatty substances in substantial amounts. This may open the door to obtaining scarce fats from plentiful carbohydrates such as sugar.

Information about this phase of the Foundation's research program and an outline of projects in physiology, medicine, chemistry, biology and food technology are available on request.

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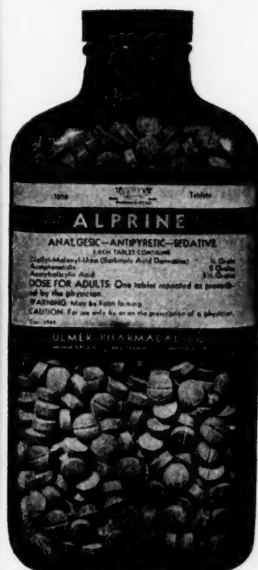
The publishers are not responsible
for any errors or omissions.

Alkaloi Co., The.....	144
Arlington Chemical Company, The.....	132
Armstrong Cork Company.....	18
Ayerst, McKenna & Harrison Limited.....	109
Babee-Tenda Corp.....	146
Baby Bathinette Corporation.....	142
Barnes, A. C., Company.....	11
Bauer & Black.....	22-23, 107
Becton, Dickinson & Co.....	22
Beech-Nut Packing Co.....	139
Bischoff, Ernst, Company.....	135
Breon, George A., & Co.....	42
Brewer & Company, Inc.....	33
Bristol Laboratories, Inc.....	27
Bunn, John, Corp., The.....	142
Burnham Soluble Iodine Co.....	115
Burton, Parsons & Co.....	119
Carnation Milk.....	21
Carnick, G. W., Company.....	103
Chatham Pharmaceuticals, Inc.....	136
Churchward & Co., Inc.....	4th Cover
Ciba Pharmaceutical Products, Inc.....	95
Cobbe Pharmaceutical Co.....	97
Cutter Laboratories.....	130
Davol Rubber Company.....	105
Denver Chemical Mfg. Co.....	132
Desitin Chemical Co.....	28
Detroit First Aid Co.....	102
Drug Specialties, Inc.....	30
Electro-Physical Laboratories, Inc.....	48
Fleet, C. B., Co., Inc.....	134
Flint, Eaton & Company.....	125
Gallia Laboratories, Inc.....	129
Hamilton Mfg. Co.....	37
Hanovia Chemical & Manufacturing Co.....	140
Haskell, Chas. C. & Co., Inc.....	126
Homemakers' Products Corporation.....	138
Irwin, Neisler & Co.....	112
Jensen-Powell Corp.....	140
Kalak Water Co. of N. Y., Inc.....	45
Knox Gelatine.....	5
Kress & Owen Co.....	9
Lakeside Laboratories.....	4
Leeming, Thos., & Co., Inc.....	127
Lilly, Eli, & Company.....	99
MacGregor Instrument Company.....	2nd Cover
Mallinckrodt Chemical Works.....	146
McNeil Laboratories.....	133
Mennen Co., The.....	25
Merrell, The Wm. S. Company.....	117
Musterole.....	142
National Biscuit Company.....	13
National Drug Company.....	131
Nepera Chemical Co., Inc.....	144
Paravox, Inc.....	123
Parke, Davis & Company.....	38
Pelton & Crane Company, The.....	121
Pyramid Rubber Co., The.....	14-15
Ralston Purina Company.....	118
Raymer Pharmacal Company.....	43
Reynolds, R. J., Tobacco Company.....	41
Robins, A. H., Company, Inc.....	116
Royal Metal Manufacturing Company.....	148
Sanborn Company.....	31, 137
Sandoz Pharmaceuticals.....	138
Schiffelin & Co.....	17
Schmid, Julius, Inc.....	50-51
Schenley Laboratories, Inc.....	46
Scholl Mfg. Co., Inc., The.....	140
Seamless Rubber Co., The.....	49
Searle & Co., G. D.....	98
Seck & Kade, Inc.....	101
Seydel Chemical Company.....	132
Sharp & Dohme.....	29
Sklar.....	145
Smith, Kline & French Laboratories.....	40
Smith, Martin H., Company.....	147
Squibb, E. R., & Sons.....	128
Sugar Research Foundation.....	114
Talby-Nason Company.....	134
Ulmer Pharmacal Company.....	113
U. S. Brewers Foundation.....	35
Vaponefrin Company.....	141
Valentine Company, Inc.....	143
Van Patten Pharmaceutical Co.....	26
VanPelt & Brown, Inc.....	34
Varick Pharmacal Co., Inc.....	39
Vick VapoRub.....	47
Walker, Myron L., Co., Inc.....	19, 20
Wallace Laboratories, Inc.....	111
Warner, Wm. R., & Company, Inc.....	3rd Cover
Westwood Pharmacal Corp.....	52
White Laboratories, Inc.....	124
Whitehall Pharmacal Company.....	
Winthrop-Stearns, Inc.....	
Wyeth Incorporated.....	
Zymenol (Otis E. Glidden & Co.).....	

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1. Ayman, David, and Goldshine, Archie D.: *Arch. Int. Med.*, 63:899, May, 1939.

2. Feldt, Robert H., and Wenstrand, D. E. W.: *Arch. Int. Med.*, 67:1157, June, 1943.

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1. Brower, J. L., and Korry, S.: *Northw. Med.*, 35: 3, Mar. 1936.

2. Stroud, W., and Twaddle, P. H.: *Annals Int. Med.*, 24: 3, Dec. 1940.

3. Cowan, J. H.: *J. of Lab. & Clin. Med.*, 24: 3, Dec. 1938.

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